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EXHIBITING

A CONCISE VIEW

OF THE

LATEST AND MOST IMPORTANT DISCOVERIES

IN

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ERRATA IN MR LAYCOCK'S PAPER.

Sect. 9. "To constitute matter of itself," *dele* "of."

Sect. 66. "The whole assembly appear conscious," *read* appears.

Sect. 69, 70. The last foot-note to 69 and the first to 70 must change places.

Sect. 76. "Will be a definite ratio," *read* "will be in a."

Sect. 136. The next section is numbered 131, consequently all the succeeding numbers are wrong.

Sect. 130, note. "Is it not equally distinct in every brain?" ought to be "It is not equally distinct," &c. and *dele* the note of interrogation.

Sect. 145, (of the incorrect numbering). "Cholera, asphyxia," *dele* the comma.

Sect. 136, (of the incorrect numbering). At the end, *for* "sexual properties," *read* "sexual propensities."

Sect. 148. At the end, *for* "illustrative 144," *put* "illustrate 150."

Sect. 150. *for* "and is also in other," *read* "as is also the case in," &c.

Sect. 150. *for* "as by diseased heart 141," &c. *put* 147 *for* 141.

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PART I.

ORIGINAL COMMUNICATIONS.

ART. I.—*Practical Observations on the Diseases of Peru, described as they occur on the Coast and in the Sierra.* By ARCHIBALD SMITH, M. D. (Continued from Vol. liii. p. 340.)

I.—DISEASES OF THE COAST CONTINUED.

On some Diseases of the Organs of Respiration.—I MAY observe in general, that on the coast, as on the mountains, pleurisy is a frequent disease, especially among the negroes on the sugar estates.

In spring, among weakly, or elderly people, the *costado-sordo*, or *peripneumonia* is a common disorder in Lima. It is sometimes complicated with a loaded state of the bowels, which must be speedily corrected, or comatose symptoms are apt to supervene.

Bleeding, purging, blistering, and the use of tincture of foxglove, conjoined with antimonial wine, are the means which, with quietude, spare diet, and pure air, contribute most to remove this affection. *Cynanche tonsillaris* and *parotidæa*, either as distinct disorders or complicated with catarrh, are both of them common during the wet season. They are generally mild affections, but sometimes otherwise, requiring great attention, and the use of depleting and strictly antiphlogistic measures.

Children are frequently observed to labour under a convulsive catarrh, in which the matter expectorated is ropy; and in endeavouring to expel it, the child is seized with convulsive paroxysms of cough that seem to threaten immediate suffocation. This disease, which is always best relieved by change of air, is not contagious; neither is it attended with the sonorous inspiration which accompanies hooping-cough. It also wants the peculiar sound observed in croup, which is a disease so rare that I only remember to have seen one case of it in Lima. In this instance, which occurred in the person of a soldier in the military hospital, a bifurcated membranous substance was thrown off from the trachea and bronchia, being the product of a high degree of inflammation in the mucous surfaces of the air tubes.

Chronic Laryngitis.—A medical resident in Piura—the most northern province on the coast of Peru—informs me through the medium of a friend,* that chronic laryngitis frequently occurs in that dry and sandy district. The prevalence of this disease he attributes to two causes; the one a general diffusion of venereal taint; the other a local irritation arising from the adherence of fine particles of sand to the internal surface of the trachea. Of this affection, I have not had the opportunity of seeing many examples in my own practice in Lima; but the worst cases that I have met with appeared to have been of syphilitic origin. The consequence of long-continued irritation in the mucous lining of the trachea is the formation of ulcers; and thus a tickling cough is induced, which the person affected often looks upon as a slight cold. Soon, however, he is undeceived on this subject, and as the disease gains ground, the friends become alarmed at the falling off in the appearance of the patient; and then assiduously resort to charms and nostrums of their own confidence and choosing.

In this way, these well-intentioned persons, whose kindly zeal is more commendable than their unenlightened practice, commonly hurry on the fatal termination of the disease by the very means which they employ to retard its progress. Hence, it is only at the last that it is usual among the natives of Piura to call in the physician. When he arrives professional assistance is too late, and it becomes necessary to declare at once the incurable state of the sufferer—to intimate the need of immediate confession, and sacramental preparation for death.

Here it occurs to me to take notice of two cases, which the mention of laryngeal affections now recalls to my remembrance; and which, I think, it may not be quite irrelevant to introduce in this place, since they show how sympathies act in obscuring the real seat of diseases.

---

* Don Santiago Tabara, a native of Piura, well known on the western coast for his remarkable acuteness, mercantile enterprise, and unbounded hospitality,—in a country where hospitality is one of the ancient virtues which even revolutionary tumults have not yet extinguished.

In one of the cases to which I allude, the patient, who was an Indian soldier lad, of fairer complexion than common, and of a soft melancholy turn of mind, had been long ailing before I saw him. He was languid and feeble; voice exceedingly low, weak, and plaintive; but of the chest or lungs he did not complain, and all his uneasiness he referred to the trachea and larynx, over which was kept up an issue: he had no cough, and the pulse was feeble, but not irregular. This youth, after having lingered for some time, died; and the body was then inspected. No trace of inflammation was detected in the trachea or bronchia, and the substance of the lungs was in a natural state; but adhesions between the *pleura costalis* and *pulmonalis* were numerous and extensive; and several large hydatids were attached between the lobes and on the surface of the right lung. The pericardium contained a large quantity of dark serous fluid, while it was of unusual thickness of texture, and the heart itself was extremely small. The diaphragm betrayed some slight appearance of inflammation diffused over it. Here the disease, during life, was chiefly referred to the trachea; but on dissection, no disease was seen there, and the slow or subacute inflammation that produced so much mischief, appeared as a general affection of the serous membrane of the chest.

In the other case, the disease appeared to be lodged in the trachea, while the stomach was the seat of pain. Thus a soldier, after three days illness, being conducted to hospital, complained of excruciating pain in the region of the stomach, rendered intolerably acute on pressure. He rolled and turned about in perfect agony; the pulse was very frequent and sunk; breathing hurried and apparently difficult. He was twice bled after his admission into hospital, and the pulse rose on venesection; his bowels were unloaded freely, and, in other respects, he was treated as for acute gastritis; but, notwithstanding these curative means, he died in about eighteen hours after his admission. On dissection, there seemed not the slightest vestige of inflammation in the stomach, and all the abdominal viscera appeared to be perfectly sound. The lungs, heart, diaphragm, and pleura, had a natural appearance; but in the trachea there were considerable traces of inflammation; in the œsophagus none whatever. The demonstrator of anatomy, who carefully examined the head, but not at the time when the above dissection was witnessed by the writer, stated that the membranes of the brain had their blood-vessels more than commonly turgid, which he considered as the result of inflammation. But the patient never once complained of his head, nor indeed of any part of his body, except inwardly, at the stomach, which, on dissection, as has been stated, exhibited no visible signs of disease, while the windpipe was obviously the seat of well-marked local inflammation.

Asthma.—This painful and distressing disease is very common in Lima, in both its dry and humid form; and persons who suffer severely in town are usually exempt from it when they travel into the interior, or merely go to the neighbouring villages of Magdelena or Miraflores. I know a respectable tradesman of Lima subject to asthma, who has for several years made a regular practice of riding out every evening, the distance of about five miles, to pass the night in the villa of Miraflores; while every morning his business calls him back to the city, where his wife and family constantly reside. In Miraflores he sleeps perfectly well; in town he cannot on account of the asthma, which is sure to come on at night.

The common exciting causes of this disease of the air-passages, are cold, distension of the bowels, or indigestion. I recollect an instance, which occurred in a robust looking lady subject to asthma, in which there was a periodical sympathetic catarrh, induced at the lunar period, when the menses happened to be either deficient or altogether suspended. In spring, a catarrhal attack is very apt to occasion a formidable asthmatic fit, wherever there is a predisposition to it; and then the matter expectorated assumes a sanguineousappearance, and the disease sometimes becomes complicated with pneumonia. In such cases the lancet is commonly indispensable, though, on several occasions, we have seen such symptoms removed almost instantly, before a barber or phlebotomist could be conveniently sent for, by the administration of a simple whey and sugar enema, which unloaded the intestines, and favoured relaxation of the skin. Free perspiration was further promoted by simple mallow and linseed diluents, with or without an addition of syrup of ipecacuan or antimonial wine. But the Lima practitioner sometimes sees severe cases of dry asthma, when the pulse is exceedingly depressed, the feeling of straitness across the breast most distressing, and respiration extremely laborious, attended with great turgescence of the jugular veins, threatening suffocation. Such cases of a nervous or spasmodic nature require the use of the lancet to remove dangerous congestion, before opiates and other anodynes are resorted to as the ordinary means of soothing irritation; and the bowels in every case demand early attention. It is, however, a general observation among Lima practitioners, and one which is frequently repeated at medical juntas, that bleeding is, for the most part, a doubtful remedy in the nervous attacks of asthma; because it not unfrequently augments, instead of lessening the paroxysm, and, by debilitating the patient, is likely to occasion a recurrence of the disorder, especially in the old, or the young and delicate. In asthma, again, of an inflammatory tendency or character, the warm bath is objected to, as in catarrh and pneumonia, because of the risk of taking cold, at a time when the frame is found to be so delicate as to be a kind of living thermometer; and in cases of this nature, such antispasmodics as opium, camphor, and musk, whenever, through imprudence or want of discrimination, they are administered, produce the most fearful exacerbations. On many occasions, cold bathing or iced-drinks, are of great benefit in asthmatics of a delicate nervous constitution; and in others a cup of coffee or chocolate, taken without design, has removed an attack, which the doctors endeavoured in vain to combat by drugs.

I once had occasion to witness, in company with my friends, Drs Kidstone and Reynoso of Lima, a most fearful looking case of dry asthma, in a strong young Zamba, in whom the attack was induced when under the influence of a choleric or angry state of mind. In the evening, when washing on the "azotea" or platform on the house-top, she was taken ill, and was quickly attended to by her owners. When we saw her, the countenance expressed the utmost distress; she struggled fearfully for breath; raised her broad shoulders almost to a level with her ears; tossed her arms in every direction and without ceasing, kept the erect posture, and drew breath in a succession of short convulsive sobs, like a person affected with hysteria. The constriction was not confined to the windpipe, for the œsophagus partook of it, and deglutition was impeded. Enemata with laudanum, assafœtida, and æther, &c. were tried in large doses, but in vain. Her pulse was oppressed, but rose on being bled; and she was bled copiously, by which the convulsive efforts seemed to abate somewhat, and the respiration to be a trifle relieved: and now medicine was with difficulty taken by the mouth, for every mouthful passed through the œsophagus by a succession of efforts, and with a gurgling noise heard distinctly by the bystanders, as it successively passed the different constrictions, (five or six in number, as indicated by the repetition of this peculiar noise,) before it reached the stomach. In less than twenty-four hours the paroxysm was ended, but she soon became somewhat deranged, and remained so for several weeks. In a few months after, she experienced constant palpitation at the heart, which she referred to her having carried in her arms up stairs, a white lady who was in an advanced stage of pregnancy, and whose care for the fruit of her womb rendered her distrustful of her own feet. This exertion on the part of the poor slave, was followed by discharge of blood with the stools, and consequently an impaired state of general health, which led to the affection of the heart.

Consumption.—Catarrh, though always prevalent and endemic on the coast, is not so serious a complaint in the wintry months of

July and August, as it is in the spring. In the former season, an attack of cold, however mild in itself, is apt to occasion a relapse of ague in those already predisposed to this vexatious and tenacious disorder; but in spring, a season when many severe cases of pneumonia present themselves, the commonest cold or catarrh generally appears under a more febrile form, and when it unfortunately affects one of a consumptive tendency, it is frequently the exciting cause of a galloping decay. For, at this season, it is remarked that consumptive patients, with which the hospitals in Lima are well supplied, die very speedily, while, at other seasons, they linger on for a longer period.

Even in summer weather, when the inhabitants of the Peruvian coast, with peculiar eagerness seek the cool of their corridors and galleries as a luxury; or stretch out their mats, and lay themselves down half-dressed at the doors, and in the areas, or court-yards, after sunset—as is customary with the humbler classes—perspiration is checked, and catarrh is the common consequence of such indulgence, as it is also of ill-timed or ill-managed bathing.

Thus persons who are habitually subject to chronic *bronchitis*, and troubled with what they call crude phlegm, or much mucous expectoration, are apt to fall into a fatal decay, as the consequence of an acute attack originating in cold. And others, who have been in a lingering state of health for some time, with a slow fever and short dry cough, or a cough accompanied with expectoration, especially in the morning, of clear and frothy sputa, are prone to have their fever increased, and to be hurried into a state of catarrhal consumption. In cases of the latter kind, it is probable that tubercles may have previously existed in the lungs, and that the accession of catarrh only serves to bring phthisis into more decided action. And, indeed, it may be made a question, whether those cases of chronic bronchitis to which I have referred, may not, sometimes at least, be instances of bronchial irritation, and consequent expectoration of a mucous secretion, sustained by the presence of tubercles. On this subject the evidence of dissection would be very desirable; but, in absence of it, there occurs to me an important fact of practical application. It is this. Whatever be the particular form or primary character of pulmonary consumption, certain states of the air of the atmosphere, depending on different degrees of altitude, appear to be either hostile or favourable to its existence or developement, according to the particular locality in which the patient happens to reside. Thus, on the coast it is a common disease, terminating in purulent expectoration and death, in whatever way it may have originated; but, on the intermedial mountains, and in the temperate valleys of the interior, pulmonary consumption is a rare malady, whether tubercular, or otherwise, in its specific character; and those affected with pulmonary disease on the coast are either relieved or cured by a residence in situations from about 5000 to 10,000 feet above the level of the Pacific.

The apostematous modification of phthisis is not uncommon on the coast. In examples of this kind, we sometimes find that the abscess, instead of forming in the lungs, is formed in the liver, and discharges itself through the lungs. And I have seen several instances in which robust men of colour had recovered from severe disorganization of this sort, even though attended with every appearance of a rapid consumption; while others labouring under a simple apostematous state of the lungs, accompanied with smart fever of several weeks' duration, have been carried off quickly after the abscess burst.

The unseasonable use of ice in eruptive fevers should be taken notice of as one of the special causes that lead to a fatal decline among the Limenos, whose fondness for ice is a strong national feature in their customs.

I have kept the following notice of a case of this description to which I was called in the last stage of the disease. A young woman, who had, at one time, a severe erysipelatous fever, on being again attacked with symptoms of the same disorder, sent for her medical adviser, who, on seeing her, observed "the erysipelas just begins to show itself; it is necessary you should take something cooling." She, therefore, began to refresh her blood by drinking iced-water with strawberry juice—"nieve en agua de frutilla"—of which the consequence was stopping of the eruption, and a determination to the lungs and bronchial passages. When I saw this unhappy girl it was hot weather; and the skin, which stood much in need of ablution, peeled and dropt off in thick scales, from all her emaciated and fever-worn body. Cough, expectoration, nocturnal increments of fever and sweats, bespoke the inevitable tendency of her malady. The matter expectorated by day was of a lighter colour, and of less offensive properties than that expectorated by night. The latter became so dark as to be nearly black, and so fetid as to be almost insufferable to a bystander: though the sick-room was freely ventilated by a door which communicated with an open veranda or balcony.

The Lima physician, in common with the rest of the community, well knows how apt pulmonary consumption is to attack those who are already debilitated by other ailments, or convalescent from some acute disease. Under such circumstances, it is not unusual to be thus accosted by some lively female patient, "Take heed, doctor, lest I should become consumptive. Ave Maria! see how thin I have grown!—should fever lay hold on me, (si me pega calentura), it will carry me off." *Calentura pegada*, which means literally adherent fever, is the common term for hectic fever. And a general wasting of strength and health coming on gradually, or, as it were by stealth, with impaired appetite, a slight dry cough, (*tosesita seca*), with or without pain at the breast or shoulders, a febrile pulse, with nocturnal heat and restlessness, are symptoms frequently precursory of those which characterize confirmed consumption.

This slow fever, so much dreaded by every one as the harbinger of *phthisis pulmonalis*, and often aggravated by daily provocations, or fretfulness and anger, is always accompanied, if not always preceded, by a diseased condition of the digestive functions. This affection is, I think, well described by Tissot as a disease to which men of letters are subject.—"This slight fever, to which some men of letters are subject, and which, by impairing the nutritious lymph, renders them pale and thin, and throws them at last into a state of decay and consumption;—a fever which itself depends on this, that sometimes a strong mental emotion excites the action of the heart, and accelerates its pulsations; but more frequently it arises from bad digestion, and a faulty condition of the chyle, which irritates the organs of circulation, and so becomes the cause of the fever; and also, if the organs of respiration are delicate and sensible, of a cough, which, united to the fever, may degenerate into hectic fever and phthisis."*

In conformity with these views, which are as applicable to the ordinary cases of incipient phthisis in Lima, as to the explanation of the origin of pulmonary affections incident to men of letters, according to Tissot, I would remark, that the chests of the Limenos, especially the male part of the white population, are commonly contracted; very rarely open and spacious, except among the dark and labouring classes; and every practitioner intrusted with the medical treatment of these people should constantly bear in mind that their respiratory organs are so delicate and easily affected, that sometimes shaving and washing the face in cold water bring on catarrh; and I have already shown how this latter affection may be the precursor of confirmed consumption.

For the removal of the cough, with hectic fever, and other symptoms which I have enumerated, the native practitioners recommend an excursion to the Sierra; and no fact appears to be better established than that this change of air and locality is the chief source of recovery in those pulmonary disorders, as I shall more particularly observe in treating of hæmoptysis.

Hæmoptysis.—Spitting of blood from the lungs is exceedingly common in Lima, and not confined to persons of any particular class or colour, though more prevalent among the fairer inhabitants of European descent.

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* See Tissot, De la Santé de Gens de Lettres, p. 33 and 34, (9th edit. 1790.)

There appears to be a general predisposition to this disease, which, as the common prelude of consumption, and the signal for leaving the social comforts and enjoyments of the capital, for the rude accommodations and dull monotony of some hill-land village, is looked upon with feelings of the most dreary and hopeless character.

The dread entertained for so formidable a disease is well illustrated by the frequent interruption which the physician meets with in the streets, from poor persons holding up their hands that he may feel their pulse, and addressing him in such terms as these,—"Doctor, grant me, if you please, one little word—'una palabrita.' I hawk up a few drops of blood, and feel pain between the shoulders. Do, I implore you, tell me if I have fever." Not unfrequently some female with an anxious look, and perhaps a tremulous voice, stops the doctor in the most civil manner, and says, "Tell me, Sir, for your own life's sake, 'por vida suya,' if I have got fever. I am nursing, and have pain at the lungs." In these cases, by *pulmon*, or lung, they commonly, if not always, mean the interscapular region; and women with pain or uneasiness in this state desire to excuse themselves from sewing or knitting, singing, or playing the piano; and observe that these occupations, like nursing, bring on spitting of blood and consumption.

Tambourers, whose rich embroidery is in great demand in Lima; seamsters, who have to toil hard to earn four reals, or two shillings, for their daily bread; and cigar-makers, of whom there are a host, are among those most liable to this disease. By such employments, or occasional causes, as I have now enumerated, the general health may be so far impaired, as to lead to the production of tubercular disease in the lungs, antecedent to the appearance of pulmonary hemorrhage; and the use of stays, also, should be noticed as one of the causes sometimes assigned by the Limenos for the presence of this latter affection, which is known to be frequently symptomatic of tubercular consumption.

Even such individuals as have been reared in the Sierra, or mountains, whose organization appears to be of a firmer texture and consistence, and whose vascular system may be supposed to be stronger than that of the relaxed inhabitants of the coast,—even those, when for some time resident in Lima, are apt to fall victims to hæmoptysis; a disease from which, as symptomatic of *phthisis pulmonalis*, the natives of the temperate recesses among the hills are mostly exempt.

On the effects of climate in this affection, for the cure of which, in Peru, climate is supposed to be omnipotent, I shall now offer a few practical memoranda.

An amiable, elegant, and accomplished young lady in Lima, * whose virtues rendered her the object of general sympathy and respect, caught cold, of which the result was a spitting of blood. This, at first, was not so serious as to determine her family or medical attendant to dispatch her to the interior. But the texture of her body, like the constitution of her mind, was exceedingly delicate, and the disease, which, from catarrh, became hæmoptysis, from hæmoptysis ran into phthisis, with rapid progress. Now, the danger was obvious and imminent, for it was impossible to mistake the hectic spot which glowed in that face upon which no one could look without interest.

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* The Limenian reader will readily recollect the person here alluded to,—Dona Marianita de Vedoya y Fernandes, a native of Huanuco.

Purulent expectoration, extreme prostration of strength, emaciation, and colliquative sweats, made her relations in town reluctant to convey her to the country; but, as their last hope for her safety, they did so, by short stages, and with the utmost care. She was carried about twelve leagues inland, to the head or *cabezada*, of one of the valleys of the coast; and though a great part of her lungs appeared to have been wasted, she lived for several years after, but always continued to be very thin, and at last died quietly and unobserved in a litter, as she was carried on men's shoulders by the lake of Chinchaycocha, about 14,000 feet above the level of the sea. During the first year of her residence in the Sierra, she had imbibed new life from the first week or two after she proceeded on her journey inland; and her strength was in a great degree renovated in the villages of Matucana, Surco, and others, about 4000 or 5000 feet above the level of the sea. Here the climate is moderately bracing, and the air fresh and equable; free from the mists that for half the year girdle the coast, and placed out of reach of the heavy rains, which, for the other six months of the year, fall abundantly on the loftier mountains.

I saw a fair young Tarmena,* who had for several years resided in Lima, when she was cold, pale, and almost pulseless, with an alarming hemorrhage from the lungs. She brought up a small basin-full of blood at a time; and, after repeated relapses of this perilous sort, her advisers at length prevailed upon her to return to her native vale in the Sierra, where she recovered perfectly.

Another Tarmena, a poor young woman of Spanish and Indian blood, who retained all the love of the indigenous race for her native land, was married in Lima; and, when nursing her own child, was attacked with spitting of blood. She left off nursing for ten days, and then, thinking herself quite recovered, she resumed her maternal office; but no sooner did her child commence sucking her than she had a relapse of the spitting of blood. I was called to see her in this state, and found her in tears, indulging in the mute sorrow of the Indian who pants for his native home, *mi pais!* A speedy return to her own country, Tarma, I strongly urged as a most certain cordial for her spirits; and a remedy for all the symptoms of disease in the lungs under which she was labouring. But her husband smiled at her importunity and longing after the sweets of her mountain home; and did not, perhaps, much approve of my advice. I lost sight of this case, and cannot say how it ended. But I may express my opinion that, had the husband desired to be at liberty to choose another helpmate soon, he could not have adopted a surer course by which to attain his object, than by confining his wife to the influence of the climate of Lima, and the necessity of nursing her child while affected with hæmoptysis.

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* Tarmena, or native of Tarma, which is an inland town, probably about 9000 or 10,000 feet above the level of the sea, and situated in a temperate climate beyond the western Cordillera of the Andes.

It is especially to be remarked that women in Lima, who are thus affected by nursing, are usually saved by weaning their children, and going for a longer or shorter time to the Sierra. And I may add, that a tour to the inland valleys is attended with immediate relief, when any invalid, no matter of what age, sex, or condition, is much emaciated and subject to a short dry cough, uneasiness between the shoulders, and a febrile pulse,—symptoms which, as formerly noticed, usually indicate incipient phthisis: and a residence in the interior for several months or years, as the case may require, frequently secures a permanent recovery.

I could name several medical men, natives of the coast, who have been attacked with hæmoptysis in the capital, and have had their health completely restored by a residence of some duration in Tarma. There is an eminent Serrano practitioner, Dianderes, I think, whose family usually reside in Lima, where he himself can seldom remain more than three months at a time, without being menaced, or actually attacked by hæmoptysis. On this account, I have known him obliged to return to his native mountains, (where his professional services are always welcome,) at a time when he descended to the capital as a member of Congress.

Young women sent to the Sierra from the coast for spitting of blood soon become round and plump. But they very often return to the coast too early, confiding in their quickly acquired strength; and then, should they become mothers, and offer to suckle their offspring, they pay the severe penalty of their indiscretion. For they are mostly sure to have a relapse, and are very frequently compelled to return again for safety to the mountains; or should they be reluctant to leave home, which is almost always the case, they are in danger of deferring their journey from day to day, till it becomes too late, and then they are precipitated into a fatal consumption,—characterized by purulent expectoration and hectic fever, &c.

The following case presents in strong contrast the influence of the climate of the coast and of the Sierra, on the same hæmoptic individual.

A young Limena became subject to hæmoptysis, and always had a certain degree of dyspnœa and wheezing in respiration. She was sent, by advice of her physicians, to the airy town of Canta, situated upon an eminence about 9000 feet, or even more, above the level of the sea, and twenty-five leagues inland on one of the roads to the mining district of Cerro-Pasco. At this station she recovered, and got married; but she could never again live on the coast for any length of time, without putting her life in jeopardy. And it is remarkable that, in Cerro-Pasco, on the high brow of the Andes, and upwards of 14,000 feet above the ocean, whither her husband's interests led her, she enjoyed the most perfect health; and none could outstrip her in a difficult ride over the passes of the Cordillera.

After having passed several years of the most perfect health in the Sierra, this lady could not return to Lima to pass the term of her accouchement, (which she was accustomed to do for the sake of better professional assistance,) without being, in less than three months' time, attacked by spitting of blood; and thus, for her own safety, she was again obliged to retreat to the hills before her infant was well able to support the hardships of the journey.

It would be tedious to dwell upon any more examples of the beneficial effects of this migration from coast to mountains, which is generally known and acted upon, all over the shores of Peru.

Breathing in elevated regions an air less loaded with the foreign ingredients which abound in the lower strata of the atmosphere, may be one among other causes, why in diseases of the lungs decided benefit is the usual result of a journey from the coast to the Sierra of Peru.

Though the blood must necessarily expand, and therefore predispose in persons of rude health and plethoric habit of body, to the rupture of some delicate pulmonary blood-vessels, when travellers accustomed to reside near the sea have occasion to ascend towards the altitudes of perpetual snow, where water boils many degrees below 212° of Faht.; yet, as we have seen, it is actually found by persons who labour seriously under hæmoptysis in Lima, and other places on the coast, that the directly bracing effects of the cool air which they breathe in the mountains are to strengthen the tunics and muscular action of the blood-vessels, as well as the general vigour of the system, and generally to counteract in a sufficient degree, any evil results to be apprehended from the expanding tendency of the fluids.

But though patients with pulmonary complaints are so frequently ordered by their physicians to remove from Lima to Tarma or Jauja, and have necessarily to cross the Western Cordillera before they can reach those places of convalescence, it must not be overlooked, that in very weakly persons, the passing of this nearest chain of the Andes is a most trying journey, even when undertaken in the dry season, and with every provision of warm clothing, bedding, and other accommodations.

Phthisical convalescents recover best at moderate altitudes, say from 5000 to 9000 or even 10,000 feet above the level of the sea; and in a climate of mild temperature like that of Huariaca, Tarma, Canta, and Matucana, &c. The two latter localities especially, are more convenient for the inhabitants of the capital, as they are situated on the western declivities of the Andes, and not far from the abundant resources of Lima, which, in cases of great weakness and delicacy, is a consideration of primary importance to the parties concerned.

Hæmoptysis complicated with some other Disease.—Hæmoptysis is frequently symptomatic of various other diseases. I have seen it as the effect of severe pertussis; an affection which is common among children in Lima. Hooping-cough, in some instances, is so severe as to cause hemorrhage from the nose, and suffusion or redness of the eyes. This is more especially the case in the lower and more humid parts of the town and suburbs. In such circumstances, the young patient should be removed, if possible, a league or two from town; for it will always be found that change of air or climate proves the surest and speediest remedy.

There sometimes appears to exist in connection with hæmoptysis, an hereditary weakness and irritability of the arterial system. I have seen both the son and the mother affected with it. The lad alluded to was about fifteen or sixteen years of age, and took fits of coughing, in which he poured forth from the lungs a small basinfull of blood at a time. But still, the pulse was strong and frequent; and neither this increased vascular action nor the hemorrhage being subdued by one bleeding at the arm, a second copious bleeding was required, after which no alarming quantities of blood were thrown up by the stress of the cough.

By the further help of opening enemata, profound quietude, free ventilation, and whey with ice, this youth recovered of his first attack. But his mother's was a chronic disease, of which she died; and complicated with thoracic aneurism, which bleeding, foxglove, and aperients, &c. alleviated, but could not remove.

Internal aneurism so commonly affects the dark races among the Limenos, in both the thoracic and abdominal cavities, that one is led to suspect the existence of an unusual degree of weakness in the arterial tunics of those people. And this idea appears to receive additional strength from the consideration, that, in passing the Cordilleras, at the more elevated breaks, the Africans are more subject than either the white or indigenous races to hemorrhagic attacks. It is to be observed, that, on the coast, most of the heavy work falls to the share of the negro, and sable casts of Æthiopian blood; and some, perhaps, would assign this fact as a sufficient reason for the greater frequency of aneurism in this class of society; but the other fact just noticed, namely, the effect of travelling on the Cordillera, seems to justify the conclusion of a greater weakness in the vascular tunics of the blacks than of the whites, —otherwise why should the former more frequently than the latter suffer from hemorrhage in sites of very high elevation? On the coast, aneurisms, external as well as internal, are often referred to acts of unusual muscular exertion, as their exciting cause, in whatever class or race of the inhabitants these affections are seen to originate. And I think that the mere expansion of the fluids of the body, in the rare atmosphere of 14,000 or 15,000 feet above the level of the sea, would not generally be sufficient to produce rupture of the vessels, even in persons of plethoric habit, if this primary cause were not assisted by the agency of muscular exertion, or cold and wet together, repelling the blood from the extremities and surface of the body, &c. to which the traveller on the Andes is very often inevitably exposed.

It is not rare to meet with persons peculiarly liable to hæmoptysis, who suffer habitually from palpitation at the heart, a feeling of tightness across the chest, and much oppression in breathing in ascending a flight of steps. When fluttered, or in a state of fever from cold, the face will appear swollen; and I have witnessed the lips become livid. I have seen the spitting of blood in a person affected in the manner described, with very intense symptoms of extreme pulmonary congestion and danger. Here the lancet afforded the most seasonable and happy relief.

There is no complication of hæmoptysis more prevalent, I think, than that in which it occurs at the menstrual period, or together with suspended catamenia: and as the subject is one of great importance, I will relate one or two cases to illustrate the form in which this disorder very commonly appears among the Limenas.

A black woman states her own case, and says, "for some months I have been greatly molested by a cough and oppression in breathing, with palpitation at the heart. This palpitation, oppression, cough, &c. all increase at each lunar period; and for two or three days preceding the two last menstrual periods, it happened that plenty of blood issued by my mouth; and as it did so, the cough became more pressing and frequent. The catamenia have never ceased to come at their accustomed time."

This woman had no fever, and no perceptible enlargement, or obstruction of any of the abdominal viscera: but she complained of a fixed pain in the right side, extending along the arch of the sixth and seventh rib.

Another poor woman, a Brunette or Zamba, relates her case in the following manner. " Five years ago, and when I was in the fifth month of pregnancy, I went in the morning to the Plaza to drink ' fresco ;' which occasioned constipation of the breast, and I was attacked by a severe catarrh, which was removed by the use of various remedies. Afterwards I caught a pectoral ailment, under which I coughed and expectorated much ; and a pain became fixed on the side of the heart.

" Since that time till now, the affection of the chest, cough with great expectoration of phlegm, has continued ; and on the recurrence of each menstrual term, I experience a great deal of palpitation and oppression at the breast, like one affected with asthma. I have had many blisters applied, but all to no purpose. My husband was very poor, and had no way of sending me to the Sierra.

" Two years ago, and during the menstrual period, I was seized with a spitting of blood, and then the catamenia were suspended, or reduced to merely a few whitish stains, *unas manchas blanquiscas*, on my linen. I was ordered to take sea bathing at the Barranco, where I remained two months ; and many times when in the water the blood came up by mouthfuls.

" My digestion is never very good. At each lunar period I suffer great pain in the belly ; and the alvine evacuations become loose, scanty, and repeated ; the heart palpitates greatly ; there is much oppression or *fatiga*, and then a copious burst of blood by the mouth. This happens every month, and it is about two years, as I mentioned, since the catamenia were suspended."

This Zamba was naturally of a very robust configuration, and, notwithstanding her long illness, was still fleshy. I saw her in the morning when the pulse was scarcely febrile. In a jug of water she had brought for my inspection the matter expectorated by her ; it floated, and appeared to be chiefly mucus streaked with blood.

She was now in a situation to allow of her visiting the Sierra, where she was to drink ass'smilk as usual with those in her condition.

In desiring to change climate, the very thing which every medical man in Lima would have prescribed, she was convinced that the blood was from her lungs, and that the mountain air was her remedy. Indeed, so familiar are the Limenos with spitting of blood from the lungs, that they always distinguish between hæmatemesis, *hechando sangre por la boca*, or vomiting of blood,—with which, perhaps, this woman's case might be confounded,—and hæmoptysis. The latter affection they express by the words *arrancar sangre*, which I have translated in the present instance spitting of blood; but the strictly literal meaning is to force or hawk up blood from the lungs.

In young women of debilitated constitutions, the catamenia frequently retire; but the immediate result is not always spitting of blood, though this is an event which may be looked for in such cases. And, with a view to give tone and vigour to the system, cold sea-bathing, as a substitute for a cooling and more bracing climate, is often recommended by the Lima physicians. But the Zamba's narrative whispers caution to those who would recommend this treatment without, at least, warning the patient who is ordered to the Barranco, (a breezy promontory between Miraflores and Chorrillos, about a couple of leagues from town,) for the cure of hæmoptysis or asthma, not to remain long in the water, lest the result should be too great a chilling of the surface, or an excessive inward congestion followed by hemorrhage.

Palpitation of the Heart, and preternatural Pulsation of the Great Blood-vessels.—A strong palpitation at the heart, and a preternatural throb in the abdominal aorta, which is sometimes confounded with an aneurismal affection, are often observed in practice. They are common results of casual irritation in the stomach and bowels, in persons of a nervous temperament; and especially in some females during the lunar periods, which in many instances are attended with great indications of oppressed breathing, headach, nausea, or looseness, &c. But these are functional derangements of a sympathetic and transitory nature.

Upon the various modifications of heart disease it is not my intention to enlarge in this place; but I shall content myself with offering a few observations, which may serve to point out the prevalence of such diseases among the Limenôs.

I was once consulted by a young gentleman in Lima, about seventeen or eighteen years of age, who, while a student in the Military College, could not, like other playful lads, run up and down the stairs and corridors of St Pedro, without panting for breath, and feeling his heart flutter tumultuously and beat strongly against the ribs, which, to the best of my recollection, were preternaturally elevated. A civil war broke out. He forsook the cloister for the field; and followed the banners of General Bermudes through the whole of his romantic campaign of 1834. Whilst on active military service among the mountains of Huaypacha, Tarma, and Guancayo, &c. the cadet felt his respiration free, and was capable of the most arduous exertions of the service he had engaged in; as he himself told me, after this fratricidal war had terminated. But on his return to the coast, his breathing again became laborious during quick motion or running up stairs. On such occasions, the flutter at the heart was impetuous; and the influence of the disturbed action of this organ on the function of the lungs and the pulmonic circulation, was well marked by a laborious respiration, and a flushed and turgid countenance.

I have also attended for several years, in Lima, an English gentleman, who suffered from painful dyspnœa, accompanied with habitual palpitation of the heart. He used to remark that his pain increased as the difficulty of breathing diminished.

At one time, when this excellent person felt, for three days together, his breathing more free and easy than he was accustomed to, I observed that, about two o'clock in the afternoon, the barometer fell one-fourth of an inch. And it deserves to be noticed that, during these three days of relief, it was observed from the bridge that the river Rimac had swollen very much, a circumstance which indicated a great fall of rain inland toward the Cordilleras. In the rainy months, on the higher ranges of the mountains, it is commonly about two or three o'clock in the afternoon when it begins to rain, sometimes in torrents; and not unfrequently the thunder is heard in awful peals resounding from hill to corrie, and from rock to rock.

Here, then, we have an instance of deranged action of the heart with disturbed respiration, relieved, in a remarkable degree, by a change in the condition of the atmosphere, marked by such a fall of the mercury as is not commonly witnessed in Lima. And may we not infer that the rarer atmosphere of the hill-land might have afforded, had it been tried, as decided a benefit in this individual's case, as the young officer already spoken of, derived from his campaign among the rugged paths and lofty dales of the Sierra? We have seen that in hæmoptysis on the coast the most effectual remedy is found to be migration to the Sierra: and what is there surprising if the enjoyment of mountain air and exercise should likewise be attended with great amelioration of symptoms in affections of the heart, which are often found to be connected with hæmoptysis, and in many cases to be altogether, or in a principal degree, sympathetic of disordered digestion?

Organic lesion of the heart is probably a common malady among the adult population in Lima, and other parts on the coast, where visceral obstructions are prevalent. The reader will have occasion to notice, in the course of the following pages, that palpitation at the heart is a frequent attendant on various sorts of gastric disease; and I might adduce many instances of this wherein the disordered action of the heart appeared to depend on a perfectly established structural disease of the organ. But I am restrained by the conviction, that such examples as I would detail, would want with the profession that full value which is founded on *post mortem* inspection, which I had not the opportunity of carrying into practice. The following example, however, may be stated in evidence of what I would desire to express on the subject.

I was called to a female, in a respectable rank of life, who, for several years before, never could lie down in a horizontal posture, and could only sleep when leaning forward, inclining to the left side, on pillows placed on her knees. In this position, her breathing, which was oppressed, became somewhat easier. I saw her a few hours before she expired, and observed that then her voice was low and subdued; her pulse exceedingly small; countenance expressive of anxiety, or even agony, and of a pale yellow colour, with livid lips; the breathing was laborious, and over the abdominal aorta there was felt a very great palpitation; the heart throbbed violently, its pulsations being distinctly perceptible all round the left side to near the spine; the feet were swollen; bowels habitually costive, and after each stool she felt for some time great faintness and restlessness; she vomited often, and everything ejected in this way was of a green colour, bitter to the taste, and mixed with ropy mucus; her thirst was excessive, and attended with an inward sense of burning heat. In this state, a vein was opened by a *sangrador* or barber-bleeder; but the blood only came away, drop by drop, to the extent of an ounce or two, when a cold sweat and a tendency to deliquium supervened. She called at short intervals for iced lemonade, and chewed the lumps of ice which floated in it with the utmost avidity. In the night of the same day on which I saw her,* as described, she expired, after years of almost unexampled patience and suffering.

This, I may remark, is one of those extreme cases which, judging by the symptoms, point to organic disease of the heart; but which, nevertheless, cannot be legitimately characterized as such, without direct proof from dissection, which was not obtained.

The following appearances, which presented themselves twenty-four hours after death, will show the state of the organs in the abdominal and thoracic cavities in a case of complicated character.

The patient was a very stout European, of large stature, and in the prime of life, who from boyhood had suffered more or less from symptoms of affection of the heart. In Peru, he had resided for several years, and the disease, after some time, became aggravated exceedingly. The palpitation at the heart, right carotid and subclavian in particular, called the attention. His breathing was easily hurried or oppressed, and his lower extremities became swollen. His temper was irritable, and his face had a turgid, somewhat livid and unhealthy appearance. The patient died suddenly in his bed, probably of apoplexy; and I here subjoin a statement, drawn up by a native, of the inspection of the body, which I myself witnessed in presence of two other physicians.

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* This patient had been long under the care of one of the most acute and enlightened native practitioners, the late, and justly lamented Dr F. Fuentes; in consultation with whom I was called to see the concluding stage of the disease.

Translation.—1. The body presented a general appearance of tumefaction, especially in the abdomen and inferior extremities. The superior extremities, like the thoracic parts, were of a livid colour.

2. The integuments and muscles of the thorax being cut into, the subcutaneous and intermuscular blood-vessels were found in a very plethoric and dilated state.

3. On separating the ribs from the sternum, the cartilages of the right side were observed to be in a state of advanced ossification, whilst those of the opposite side preserved their proper cartilaginous type. Besides, a small degree of exfoliation was seen in the anterior extremity of the right clavicle.

4. The cavity of the thorax presented us with the right lung in its natural state, but inclining forwards and fluctuating in a great quantity of water, of an albuminous nature, which filled this side. The heart, which was of large size, adhered at its base to the diaphragm, and occupied not only the middle part, but nearly all the left side,—the lung of the same side being confined to a narrow space in the upper part of the cavity, and in a state of complete atrophy.

5. Following the course of the great trunks, the right jugular vein was seen dilated throughout its whole extent, with a varicose pouch about its middle portion.

6. Having opened the abdominal cavity, it was found to contain a very considerable quantity of water, and the intestines looked as if they had been affected with some degree of inflammation. The liver was of so great a magnitude that it almost touched the ridge of the ileum.

Lastly, the spleen was well-concentrated, but the remaining viscera continued in their natural state and position.

Such is the diseased condition in which were found the organs of both the thoracic and abdominal cavities,—a condition which manifests how difficult must have been the existence of this individual, and, at the same time, how inevitable his death, even in the flower of his age.

(Signed) Heredia,
Demonstrator of Anatomy.

Lima, 1831.

Errata et Corrigenda in Dr Smith's Paper, Vol. liii.

Page 298, line 8th from bottom, *for* quam *read* quum.
—— 333, —— 15, *for* chupones *read* chupos.
—— 336, —— 40, *for* petechial *read* petechiæ.
—— 339, —— 20, *for* citron ointment *read* citrine ointment.
—— 340, —— 21, *for* rigador *read* regador.
—— 340, —— 29, *for* pigues *read* piques.

Art. II.—*Report on various cases of Gunshot Wounds received in actions in Upper Canada in* 1838. By William Home, M. D. Assistant-Surgeon to the Forces. In a Letter to Dr Craigie. Communicated by Sir James M'Grigor, Bart.

Dear Sir,—In sending you the following notes and observations on some cases of gunshot wounds which came under my notice, as a result of the late disturbances in this province, I am guided more by the desire of fulfilling a promise made to you, of communicating whatever I might conceive likely to prove interesting to the readers of the Journal you so ably conduct, than by any wish I feel to obtrude myself on the notice of the public.

The state of insurrection in which a portion of this country has now for a considerable time existed, and the outrage and bloodshed from which it has suffered, have naturally drawn towards it a large share of the attention and interest of the British public; and, trusting that some portion of this is extended by the members of the medical profession to the events that relate in an especial manner to their branch of science, I have been induced in the following pages to embody a detail of the cases of gunshot wounds, which I had an opportunity of seeing, more especially those which were consequent on the encounter at Wind Mill Point in the neighbourhood of Prescott. I am far from supposing that any remarks of mine can add to our knowledge of this branch of military surgery, which has engaged the labours of men as far surpassing me in ability and zeal, as their opportunities of observation have been greater than mine. I am not, however, without a hope that even a limited number of cases, not of every day occurrence, faithfully narrated, their progress accurately detailed, and any suggestions of a practical nature which they seem to warrant cautiously offered, may be regarded as not altogether devoid of interest.

Of the various rencounters which, during the spring and autumn of 1838, from time to time occurred, none was perhaps of greater interest in a professional point of view than that of Prescott. From the strong position there taken up, and for several days maintained by the invading band,—from the vast numbers, who from all quarters assembled to repel invasion from their soil,—and from the utter overthrow which finally befel the unorganized band of Canadian rebels and American sympathizers, the amount of wounded on the occasion was necessarily considerable. A fortnight, however, having elapsed, before I had an opportunity of personally witnessing its results, and during that interval, several of the most severe cases having terminated fatally, and many who had suffered in a less degree having become scattered over the country, the number as they came under my notice was considerably lessened, and the materials from which the following remarks were supplied were correspondingly circumscribed. Before, however, proceeding with an account of these, I may briefly notice one or two, who, having been wounded in previous rebel encounters, I had an opportunity of seeing in stages more or less advanced in different parts of the country.

At Montreal, I visited such of the sufferers from St Charles, as, after a lapse of three months, were still inmates of the hospital, and at Kingston, I saw among the invalids on their way to England, those who, in consequence of wounds received at Point au Pelee, and other skirmishes in the west, were rendered unfit for the duties of the service. Viewing, as I then did for the first time, the effects of gunshot wounds on the soldier, I could not help being forcibly struck with the great exaggeration which the majority made use of, chiefly through the medium of pretended stiffness of joints, weakness or rigidity of muscles, and painful sensations in the neighbourhood of injured parts, to impose on their medical attendant, for the purpose either of escaping duty, or of eventually being recommended for pension and discharge. And I could not help reflecting, that, witnessing as a medical officer does, such a disposition on the part of the soldier, to exaggerate the effects of the most trifling and insignificant flesh wounds, into a cause of unfitness for the service, and claim for pension, what a lesson he ought to learn as to the amount of caution requisite in subscribing to alleged incapacity, where such is consequent on wounds which were at first even dangerous or severe.

One of the cases which, with many others, led to the preceding remarks, was that of a man, who at St Charles received a flesh wound immediately in front, and over the centre, of the patella. From the account I received of the case, (for the wound had healed completely when I examined it), whether inflicted by a passing ball grazing it, or by one almost spent striking it directly in front, it was quite superficial, and, though remaining long in the form of an indolent ulcer, it eventually healed soundly and completely. But the patient, having experienced the comfort of a Canadian winter spent in hospital, felt by no means disposed to return to his duty. The patella he declared to be frequently the seat of excessive pain, which prevented his bending the knee-joint, besides which he stated that all attempts to walk, even with the limb rigid, caused much uneasiness. A variety of remedial measures were tried; but all, of course, proved ineffectual. Neither good treatment or bad, or coaxing or threatening, had any effect in inducing him to make use of the extremity; and, though nothing in the slightest degree unnatural was either to be seen or felt, so obstinately did he persist in his alleged disability, that some medical men even began to manifest a leaning towards conversion, and to exert their ingenuity, but in vain, to discover some possible cause for the symptoms of which he complained. The last I heard of him was his being ordered out of hospital, and threatened with punishment if he persisted in alleging unfitness for his duty.

Several of the St Charles' cases were severe. In one, a ball passed through both cheeks, and, traversing in its course the upper surface of the lower jaw, carried before it all the teeth and alveolar processes. Another patient suffered violent constitutional disturbance from a ball lodged in the hip-joint or its immediate neighbourhood, while a third recovered without any untoward symptom from compound fracture of the femur. One man had both tibiæ and fibulæ broken by the same ball. But the most interesting was a wound of the head, from which recovery was rapidly taking place; when pneumonia, induced by accidental exposure, suddenly cut off the patient, the fatal event being in no way connected with the previous injury. In this case, the ball, grazing the forehead, had inflicted an elongated wound of the integuments, and had exposed to a small extent the frontal bone. By the employment of the antiphlogistic regimen, and the use of emollient applications, the surrounding soft parts threw out healthy granulations; but in the centre the bone remained bare, as at first, and uncovered by periosteum. On dissection, the denuded part of the external table was found to be dead, and in the process of being detached from the living by a distinct line of separation; subjacent to it a much larger portion of the internal table was also dead, in the process of separating, and traversed by a fracture which, strange to say, did not manifest itself in the external, proving thereby that a force applied to the outer table, sufficient only to destroy its vitality to a small extent, may do so more extensively to the internal or vitreous, which it may even fracture, the outer escaping probably by its greater elasticity and more yielding nature.

Having premised the few preceding remarks on the cases of which I was enabled to take but a casual and passing glance, I shall now proceed to what is more properly the object of this communication;—a review, namely, of the wounds I had an opportunity of witnessing subsequent to the engagement at Prescott, which took place about the middle of November 1838. At that time my station was Kingston, about seventy miles higher up the St Lawrence than Prescott; but, being unfortunately absent on leave at the time, I did not witness the action itself, or its immediate effects, which I regret, as I am thereby prevented from rendering the account more complete, by stating the whole number that suffered on that occasion, not omitting the nature and seat of the wounds, which had been followed immediately, or soon after, by a fatal result. On returning from a tour in the United States in the end of November, I lost no time in visiting those who were still suffering from their wounds, among the Royal Marines, the 83d Regiment, the Militia, and the prisoners taken on the occasion. These I found amounted in all only to 37, and were divisible, according to the situation and nature of their injuries, as follows; 2 were wounds of the face and head, 1 of the neck, 1 of the chest, 1 of the groin, 2 of the hip, 14 of the thigh, 1 of the knee-joint, 7 of the leg, 1 of the arm, 5 of the fore-arm, and 2 of the fingers. 23 out of the 37 were flesh-wounds of greater or less severity, while the remaining 14 involved also a lesion of the bones. It would be an unprofitable task to enter into a minute detail of each individual case; and I shall notice those only which manifested any circumstances of peculiarity or of interest.

Face.—In one of the wounds of the face, the inferior maxilla was fractured and splintered, a little to the right side of the symphysis. In this case, great difficulty was experienced during the treatment in keeping the smaller portion in its place, and in counteracting apparently the action of the pterygoid muscles, which drew it inwards, their operation being no longer opposed by the arched properties of the entire bone. The means found finally effectual in retaining the parts in proper position was a stretcher of firm wood, notched at both ends, and inserted between the canine tooth of the left side, and the anterior molar of the right.

Neck.—The solitary wound of the neck, occurring in a soldier of the 83d Regiment, is in some respects curious and interesting. The ball entered three inches below the mastoid process, on the left side, and, passing obliquely backwards, made a second aperture in the integuments on the back part of the neck, and in this it was retained. The wound was in length only four inches superficial throughout, and involved soft parts alone. The first dressing employed consisted of a bandage hastily put on, and this, on being removed the following day, permitted the ball of its own accord to fall out. On entering, it had passed through the collar both of the greatcoat and coat, his stock, and the collar of his shirt. On examining the ball, I perceived it at one part slightly flattened; and on minutely observing it, I remarked that, at the part where its convexity was diminished, it was distinctly marked with numerous lines, crossing each other at right angles, having evidently received this impression from some material through which it had passed, or against which it had struck. Being at a loss to explain this appearance, it was not a little satisfactory, when on inquiry, I found that, instead of the usual leather stock worn by the soldiers, he, on that occasion, had on a silk one, the stiffening material of which was canvass, in texture exactly such as had impressed its mark upon the bullet. The circumstances of this case suggest the inquiry, how it happened that, of the different substances through which in its course the ball passed, the canvass alone was able to oppose a sufficient degree of resistance to alter its shape, and even to stamp it with the impression of its cross-threads? To this, the answer appears to be, that the effect was entirely due to its superior elasticity and toughness,—qualities tending more to arrest the progress of a moving body, than firmness and strong cohesion. From the marks made by the canvass, and from the force of the ball, though enough to make a second opening in the skin, being insufficient to carry it completely out, we are justified in supposing that, had its momentum been somewhat less at the time of striking, its further progress would have been effectually checked by the resistance offered by the stock; and perhaps the advantage of having materials possessed of such properties as canvass, about the soldiers' dress, may be, in some measure, pointed out.

Chest.—The single case of wound in this region occurred in one of the American prisoners, and was situated in the lower part of the right side. The ball entered on a level with the ensiform cartilage, and one inch to its right side. It passed transversely across, and made its exit by an opening ten inches distant from the point of entrance. Except the fever and local uneasiness which followed, there was no reason to suppose the ball had entered the cavity of the chest, or had injured directly the parts within. In fact, from the slightness of the cough, the respiratory murmur being heard, though feebly, and percussion being but slightly impaired a month after the injury, when I examined him, it was pretty certain that its course had been exterior to the pleura. From the physical signs, however, it was not improbable that a modified degree of pleuritis had existed, which was in the process of subsiding when he came under my observation.

This lad, of feeble habit and delicate conformation, distinctly stated in reply to my questions, that phthisis existed in his family, which circumstance naturally leads to the following interesting points of inquiry. Are wounds of the chest, in such as are predisposed to consumption, apt to excite the disease? And if so, are those that are slight or severe most likely to do so? Without having given the question the consideration which its importance merits, I am inclined to suppose that the more severe the wound, the greater is the subsequent debility, and the longer the period of convalescence; and on these two accounts chiefly, the more likely is the patient to lapse into tubercular phthisis. This remark applies to wounds in all situations, but, I believe, in the case of the hereditarily consumptive, more especially to those injuries involving the chest; as thereby increased action is set up, and maintained in a part where vascular determination is but too apt to result in a definite and irremediable morbid deposit.

Groin.—The wound of this part received by one of the marines was of a trifling nature.

Hip.—Two cases. One of these a lad of 20, a native of Lower Canada, and the only one of the seventeen wounded prisoners who was not an American by birth or naturalization. The ball, which passed transversely across, through the fleshy parts of both hips, on a level with the coccyx, must, in doing so, have pursued a curvilinear or waving course, as the lower part of the sulcus of the nates was considerably below the level of a line joining the two external wounds. Where it passed immediately beneath the skin, and over the coccyx, there was tenderness, but no evidence of the bone having sustained any injury, from which the slight degree of motion of which, at that period of life, it is possessed, might have served in some measure to protect it.

The other case of wound in this situation was that of a soldier of the 83d Regiment, a man of good character, and a non-commissioned officer. It was a flesh wound, and little more than a cutaneous one. Five inches intervened between the two openings in the fleshy part of the left nates, and that the ball had taken a superficial course was evident, by a distinct chord of induration being felt immediately under the integuments connecting the two orifices. It healed kindly and quickly; notwithstanding which this man has ever since persisted in walking lame, and has hitherto, a period of more than twelve months, been lost to the service. He affects to have such an amount of pain in the groin, and of stiffness in the limb, as to prevent his walking but with short steps and a halting gait. That he has sustained an injury of any deep seated important parts is utterly impossible, and that this disability is entirely feigned, for the purpose of accomplishing some secondary object, may with equal certainty be affirmed. The alleged facts of his having a young wife at home, to whom he is much attached, and whom he cannot afford to bring out to this country, may throw some light on his attempts to be invalided and sent to England.

Thigh.—Of the fourteen cases of wound of this part, but few presented any interesting features. Three were in militia soldiers, four were in marines, six were in prisoners, and one was in a soldier of the 83d Regiment. Of all, two only were accompanied with fracture of the bone; and of these, the first, treated from the beginning on the double inclined plane, went on remarkably well, manifesting from first to last not a single untoward symptom. The other, a prisoner, probably from not having proper attention paid to him at first, suffered severely from constitutional disturbance, with long-continued and copious suppuration. Union, however, eventually took place, and the cure was complete.

The situation of both these fractures was the middle of the femur; and I confess I was not a little astonished at the rapidity with which the first got well, and at the final and perfect recovery of the second, from an injury which, as a result of accidents in civil life, so frequently either demands amputation of the limb, or brings the patient's life into imminent peril in the attempt to save it.

Intermediate between these cases of compound fracture and the simple wounds of the cutaneous and muscular parts of the thigh, were two of remarkable similarity, one in a marine, the other in a soldier. In both, the balls entered at the same spot, the median line anteriorly, on a level with that part of the femoral artery crossed by the Sartorius. From this they passed directly inwards: striking the femur, and turning round its shaft, they lodged at the opposite point of the limb posteriorly, immediately under the skin. That such was the course taken in both cases was evident from the shape assumed by the balls. These were both altered at one part of their circumference, in extent equal to about a third part of their surface, being concavely depressed, and in the depression perfectly smooth; in fact, exactly such an alteration of form as might have been expected to result from the cause above stated. And did a doubt exist as to their having taken a deep intermuscular course in opposition to a subcutaneous one, the want of any induration or superficial tenderness, as indicating the latter, and the tediousness of recovery, the copious suppuration, and smart constitutional symptoms, as marking the former, must prove perfectly satisfactory. Such being the case, does it not appear astonishing, that, notwithstanding the force with which the bullets in both these cases struck the bone, being sufficient to flatten and indent them to such a degree, the femur should have escaped not only without fracture but without injury? Should we not rather have expected, that, if splintering had not taken place, the part receiving the blow would have had its vitality so impaired as to have undergone necrosis? But nothing of this kind resulted in either case; the shaft of both bones preserved their natural dimensions, and was not the seat of morbid sensibility at any point.

The flesh-wounds presented little worthy of notice. In one, acute inflammation of the knee-joint of great severity, confining the patient to bed for many weeks, and causing lameness for a year afterwards, followed the imprudent attempt at slight exercise a week after the receipt of a trifling wound in the immediate vicinity of the articulation. Considering the difficulty experienced by the surgeon in convincing his patient of the great risk he runs by attempting even slight motion in cases of this kind, I conceive he is justified in having recourse to a retentive apparatus, such as the double inclined plane, whereby to render motion altogether impossible, and thus both to accelerate the cure, and to insure an immunity from accidents like that above-mentioned. When house-surgeon in the Infirmary of Edinburgh, I had frequent opportunity of witnessing the benefit derived from the employment of that modification of the double inclined plane, known by the name of Macintyre's splint, in chronic affections of, and injuries in the neighbourhood of the knee-joint; and, when all of these were not in requisition for fractures of the thigh or leg, I never failed to use them in such cases.

From the quantity of soft parts surrounding the femur, the suppuration in many of the flesh wounds was very tedious, the abscesses large, and the constitutional symptoms severe. I think I have seen good reason to dissent from a very common practice pursued in the treatment of suppurating cavities and abscesses, that, namely, of squeezing and compressing their parietes with the hand at each dressing, with the view of evacuating as much of their contents as possible; and in the case of those following gunshot wounds, with the additional object of getting rid of such foreign bodies, as, being carried in with the ball, have been, if not the originating, at all events the maintaining cause of such purulent collections. In compressing the sac, independent of the pain so caused, which is on many accounts highly objectionable, we remove a secretion, which, unless it is the product of high inflammation, is the mildest, the most bland, and soothing application possible to the suppurating surface which secretes it; and to supply its place after the compression is removed, the walls of the cavity returning by their elasticity to their former position, necessarily suck in a certain portion of air, which, both by its action on the fluid still remaining, and on the walls of the abscess itself, is exceedingly prejudicial. That air does enter in some instances, I had ample opportunity of proving in one of the cases at present under consideration. The patient as well as his medical attendant both acted on the old, and, as I am attempting to prove, improper principle of evacuating as much as possible at each dressing. The cavity was very large, and its limits I often exactly defined, subsequent to the dressing, by means of the tympanitic sound elicited by percussion on the finger placed immediately above it. The abscess occupied the middle and outer third of the thigh, and was both very tedious in healing, and was accompanied by much disturbance of the system at large. If purulent matter, being formed under high excitement, may be supposed to possess irritating properties, or if foreign matters are conceived to be lodged in the cavity, then by far the best mode of procedure is to dilute, change, and remove its contents by injections of tepid water, gradually and gently thrown in from a large smooth-working syringe, by which practice the additional advantage of fomentation also may be obtained.

Knee-joint.—This was the only important articulation which directly suffered on the occasion, so far as my observation went. It was in the case of one of the militia, in whom the ball, entering low down in the thigh, shattered the external condyle, traversed the joint, and passed out between the internal condyle and the head of the tibia. The symptoms, both constitutional and local, were, as might have been expected, of great severity, but, by the unremitting care and judicious treatment of his medical attendant, after the separation of several pieces of bone, and the long continuance of copious suppuration, a cure by ankylosis was finally effected.

Leg.—Of wounds in this situation there were seven cases, two of which were compound fractures. In one, a prisoner, in whom secondary amputation was performed with success, the ball was almost completely divided by striking the fibula about two inches from its head. Without fracturing, it passed in front of this bone, through the head of the tibia, and lodged beneath the skin on the internal aspect of the limb. Fortunately no fracture extended from the aperture made by the ball in the bone, up towards the knee-joint, which, even to the time the limb was removed, remained perfectly free of inflammation ; but a longitudinal fracture ran for nine inches downwards through the shaft of the tibia, almost in the median line. Amputation became necessary, from the exhaustion induced by the irritative fever, five weeks after the receipt of the injury. One of the cases manifested a curious instance of the effects on the soft parts which result from a ball striking and contusing, but not breaking the skin. One of the prisoners, who at the time wore a Wellington boot, was struck by a ball, which passed through the leg of his trousers two or three inches above the ankle, and, making a hemispherical depression in the subjacent leather, fell to the ground without inflicting any apparent injury. On taking off the boot and stocking, which was not done for a day or two afterwards, the leg was found, at the part injured, to be dark-coloured and insensible in a circular patch, the integuments there being in fact killed, and in the act of separating from the surrounding parts. After this was thrown off, a weak flabby ulcer was left, extremely tedious and difficult of cure.

The only other case in this class deserving notice is that of a marine, who was struck by a ball about two inches and a-half above the external malleolus of the left leg. He continued firing for some time, and afterwards walked to the town of Prescott, a distance of a mile and a-half. Immediately on his arrival there it was dressed ; and, on being examined by the probe, its course was found to run under the *tendo Achillis* ; but there being but one wound, and no ball being felt, it was supposed that it had come out during the exertion of walking from the field. Four weeks after, when I saw him, the wound was nearly healed, and no sinus existed; but he continued to complain of an impediment in the motion of the muscles of the calf, and, as he himself expressed it, of a sensation of want of the usual spring in the foot. On careful examination, a deep-seated induration was felt beneath the *tendo Achillis*, which his surgeon attributed either to a deposit of lymph in the course taken by the ball, or to a diseased action set up in the tendon at the point of injury. I felt more disposed to believe that it was really the ball itself, which, from its deep situation, and probably surrounding infiltration of lymph, communicated the sensation of being larger and less firm and resisting than it otherwise would have done.

It occurred to me that the question might at once be decided by exploration with an acupuncture needle; an instrument which I believe will be found of greater value to the military surgeon than is generally supposed, from being a more efficacious remedy for nervous and rheumatic pains, whether real or fictitious, than many others in general use. This instrument I slowly introduced with little or no pain, in the direction of the tumour, which it had no sooner reached, than the characteristic sensation of the contact of two metallic bodies was elicited. No doubt now existed as to the line of treatment proper to be adopted. A deep incision was made; the ball was removed, and the patient was soon able to return to his duty.

This mode of using the needle, so far as I know novel in its application, may, I conceive, be employed in many cases, as on this occasion, with advantage, in leading to a positive conclusion where doubt exists. Had the same treatment been practised when the man first came under observation, he might have been returned fit for duty many weeks before he actually was so; and had it not been employed when it was, I really believe that, from the view which the surgeon in attendance took of the case, he would, in all probability, have been invalided, and sent home to England, as being affected with irremediable lameness, the effect of his gunshot wound. I forgot previously to remark, that the tumour, even when firmly compressed, was not in the least degree painful, the only circumstance which tended to raise a doubt in my mind as to its being the ball; for I could hardly bring myself to believe that a foreign body of such recent introduction could have caused so little irritation as not even to excite uneasiness when roughly handled.

Arm and Fore-arm.—Two out of six cases of wounds of the superior extremity were accompanied with fracture, and both these and the others reached a favourable termination without the occurrence of any circumstance worthy of notice. From an accident while loading, the charge of an eighteen pound carronade carried away the outer portion of the hand, and shattered the parts much. Amputation of the fore-arm was performed. From the description given me of the case, by which it appears that the thumb had completely escaped, and that the forefinger had been but slightly injured, I am induced to believe that an attempt might have been made by partial amputation, or by simply removing the lacerated parts, to preserve to the patient the thumb and index-finger, which together would have proved far more useful that any artificial substitute for the hand, however ingeniously contrived.

Fingers.—In one of two cases of wounds of this part, the second joint of the middle-finger was perforated by a ball which passed between the phalanges and shattered their extremities. It was deemed advisable to attempt the preservation of this comparatively unimportant part of the body; and four weeks after the receipt of the wound, when I saw him, the articulation was open as at first, suppurating copiously, the neighbouring parts much swollen, the ends of the bones still bare, and the cure, which could only be by ankylosis, evidently remote. Under these circumstances, immediate amputation appeared to me to be decidedly the most proper treatment; and having noticed the case, I may be excused for mentioning a mode of repairing the loss which occurred to me, and which, had it been practised with success, would have proved exceedingly curious. At the time this patient was in hospital, and the amputation of the finger was advised, several of those who had acted as leaders in the piratical incursion at Prescott, were, by undergoing a capital punishment, made to suffer the penalty which they had so richly merited. The plan proposed was to amputate the middle finger of one of the executed prisoners as soon after life was extinct as possible; then having performed the same operation in a similar manner on the above patient, to apply the finger of the former to the surface from which the other had been separated. We should thus, in my opinion, have given a chance of union, being affected under circumstances as favourable as many in which the rejunction of severed parts has been, beyond a doubt, proved to have taken place.

In taking a general view of the preceding cases, it appears to me that their progress was much more rapid and satisfactory than the ideas I had previously entertained of gunshot wounds would have led me to expect. The treatment invariably pursued at first was the use of warm emollient applications, which proved constantly most soothing and agreeable to the patient's feelings. Where sinuses continued for any length of time to discharge, the cause which in many of the cases appeared to prevent their closing, was portions of the clothing, often of such minuteness as almost to escape notice, which, being carried in by the ball, remained lodged in the wound. When such foreign matters were contained in them, the discharge in several cases, instead of exhibiting the usual characters of pus, was thin and watery, like that coming from a sinus leading to a diseased bone. The foreign bodies appeared, if two wounds existed, most frequently to prefer for their exit that one by which the ball had made its escape. From this observation we would be inclined to recommend the practice of frequent syringing for the cure of sinuses, not by the employment of stimulating or astringent injections, with the view of promoting their contraction, but by the use simply of tepid water, for the purpose of aiding in the removal of the foreign substance on the presence of which their existence not unfrequently depends. But the suggestions offered on this, as well as on points formerly mentioned, based as they have been upon experience so limited, and a sphere of observation so contracted as the present, must be viewed in the light more of hints to be submitted to the test of future experiment, than of conclusions founded on the result of trials adequate to determine their truth and real value.

In concluding this short account of the first series of cases, I have had it in my power, since entering the public service, to offer to the profession, I have to express my regret that it did not fall to my lot to witness a greater number of the gunshot wounds to which the rebellion in Canada has, during the last two years, given rise; and I have still more to regret, that those I did see had not fallen under the observation of some other individual, who, equally desirous with myself to submit them to the profession, would, by embodying more interest and instruction in their detail, have proved himself better fitted for the task, than, my dear Sir, your former pupil, and very sincere friend,

Kingston, *Upper Canada*, WILLIAM HOME, M. D.
December 1839. Assistant-Surgeon to the Forces.

ART. III.—*Cases of Great Enlargement of the Stomach, with Remarks*, by JOHN HOME PEEBLES, M. D., Member of the I. and R. College of Physicians, Florence; Fellow of the Royal College of Physicians, and Physician in Ordinary to the Royal Infirmary of Edinburgh.

THE stomach has occasionally been found preternaturally distended, dilated, or, more correctly speaking, enlarged to such an extent, as to fill the whole of the abdomen from the epigastrium to the pubis. A large accumulation of fluid almost always accompanies this morbid condition of the viscus; and the name of dropsy of the stomach has been assigned to it by some authors. This enlargement of the organ is not unfrequently attended with disease of the internal and muscular coats, and sometimes of the pylorus. In other cases, these parts are found to be healthy, and the enlarged stomach is then considered to be in an unusually relaxed or atonic state. In both conditions of this viscus, some parts of the intestinal canal are much contracted, with or without thickening of the coats, and there is also occasionally a diseased state of some of the abdominal viscera.

This disease is so very rare, that but few instances have fallen under the observation of any practitioner.

The following are the cases that I have been able to collect from medical authors, and which I shall divide into three series.

1. Comprises cases with lesions of the coats of the stomach, with or without disease of the pylorus, or contractions of the intestinal canal.

2. Includes those in which the coats of the viscus are found to be healthy, and the pylorus free from disease, but where there are sometimes contractions of the intestines.

3. Is a collection of cases, which are too imperfectly recorded to enable us to draw any conclusion from them, and are only given in illustration of the enlargement of the stomach.

FIRST SERIES.

CASE I.—Mauchart [*] relates the following case of a man whose health had been deranged for eighteen years, who had scarcely quitted his bed during that time. His malady commenced insensibly. He had occasional vomiting; at other times diarrhœa; sometimes symptoms of disorder in the breast. The most celebrated physicians could not discover the cause of his disease, and afforded him no relief. He died almost suddenly, although for some days previous he had felt stronger and more vigorous than usual, and had eat a full meal only two hours before.

On dissection, the body was much emaciated, the abdomen much distended. The intestines, forced into the pelvis, were in a great measure concealed by the stomach, which was enormously enlarged by gas and fluid. It had descended a hand-breadth below the umbilicus. The epiploon was contracted, and adhered to the great curvature of the stomach. It had no fat, but showed numerous blood-vessels. The small intestines were filled with gas and fluid like the stomach, but the colon was small, and contained nothing. The spleen, larger than usual, adhered to the diaphragm by its posterior part. The rest of the viscera were in a normal state, although many physicians had declared there was a tumour in this region. The stomach contained twelve pounds of a bloody fluid of a fetid odour, black like ink. The colour was occasioned by a hemorrhagy from the nose, which happened two days before. The coats of the stomach were so thin that they were scarcely the thickness of a sheet of paper. They were thickened towards the pylorus, but the pyloric orifice was not contracted. The liver adhered very strongly to the stomach. These two organs sent out reciprocally long fibres, and their substances appeared to be confounded together.

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[*] Miscellan. Academ. Nat. Curios. Dec. iii. et iv. 1696, p. 142.

CASE II. is related by Bonetus.* A woman of large stature, aged 48, had a tumour in the abdomen gradually increasing, so that she believed herself pregnant; but the time of gestation having elapsed, she consulted a physician, who pronounced her dropsical. Medicines were tried in vain. The tumour enlarging gradually, at length increased to such a size, that she was scarcely able to carry her burthen, although she continued to discharge her usual duties. She at last fell into a continued fever, with difficulty of breathing, insatiable thirst, with great restlessness, and she died in seven days after.

Sectio Cadaveris.—Before proceeding with the examination, the body was tapped, and ninety pounds of serous fluid were drawn off. On opening the abdomen, the peritoneum adhered so firmly to the stomach that it was impossible to dissect them, or to separate them by force. It was found that the trocar had entered the stomach. This organ was of unusual magnitude; and its two orifices so near that they touched each other. The omentum was in the inferior part; the liver and the rest of the bowels were sound. The stomach measured more than a French ell. Its depending part contained the remainder of the serous fluid. Each orifice was sound; but in the opening of the pylorus was a cyst of the length of the middle finger, and a little larger than the thumb, filled with limpid fluid, and entering into the duodenum. Besides, the internal membrane of the stomach was covered with many hydatids, partly whole, and partly broken.

CASE III. is given by Hasenohrl.† A woman, aged 50, had been addicted to the use of spirituous liquors. She very often rejected her food; the bowels were constipated. For the last year vomiting became more frequent, till at length she rejected all her food six or seven times a day or oftener. She died wasted and exhausted.

Necroscopic Appearances.—The common integuments being removed, a membranous body of immense size was discovered, extending from the diaphragm to the border of the pubis, and covering the whole contents of the abdomen. Even none of the intestines were visible. This being removed, the whole of the large intestines were exposed to view, which were found so small and contracted, that they equalled only the diameter of the index-finger. Nothing besides was worthy of notice, except that they contained indurated fæces. This enormous membranous body was found to be the stomach, which was distended to such a size as to contain easily twenty measures of fluid. The pylorus was thickened and contracted, being altogether surrounded by a cartilaginous ring. The liver was indurated, and the spleen smaller than usual.

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* Sepulchretum, Lib. iii. Sect. xx. Obs. 48.

† Sandifort's Thesaurus Dissertationum, Vol. i. p. 3.

Case IV.—Bang[*] gives a case of vomiting in a man of 52 years, which had followed a few days after the exhibition of a strong emetic. It was then of six months duration. All the ingesta could only be retained a few hours. He complained constantly of pain in the cardiac region on pressure; but no hardness could be detected there. The bowels were sluggish, the pulse very weak, and there was great emaciation. The patient lived fourteen days in this way after his admission into the hospital.

On opening the body, the stomach was found of an enormous size, extending below the umbilicus and to the right iliac region. It contained partly air, which was with difficulty pressed through the pylorus; and partly a great quantity of brown liquid, of a strong acid odour. The right extremity of the stomach contracted for about a hand-breadth near the pylorus. The substance hard through the whole circumference; the diameter the thickness of a finger-breadth; the opening was much straitened, yet pervious; many glands of great size, and a number of nuclei in the internal surface; the intestines greatly contracted; a gelatinous fluid was effused into the abdomen; the pericardium much extenuated; and the heart much diminished in size.

Case V. is one recorded by Chaussier,[†] of a man 50 years of age, who had been for a long time in infirm health. Pain in the epigastric region, especially after eating; copious vomiting, returning at intervals of four or five days; constipation; urine scarce; legs œdematous; and abdomen much distended. This case was mistaken for dropsy, and tapping was performed. Air, and some pounds of a fluid slightly mucous, frothy, and of a blackish-colour, escaped. The patient seemed immediately relieved; but very soon he experienced anxiety and feebleness, and he died in the course of the night. On dissection no fluid was found in the abdomen. The stomach was prodigiously distended, and descended even to the pelvis. It was discovered that this viscus had been pierced by the trocar. It contained fluid resembling that which had been evacuated by the puncture. The pylorus was scirrhous, and cartilaginous in some parts.

Case VI.—A man aged 31, a vine-dresser, was received into the Hospital of Beaune on the 6th October 1816, for a chronic affection of the stomach. He stated his disease was of three years standing, and produced by a fall. There was difficult digestion; a sensation of heat, which appeared to arise from the presence of acid water or gas, which he disengaged by frequent eructations; a painful swelling, which, by pressing back the diaphragm, threatened suffocation, by diminishing the capacity of the thorax; appetite variable, but on the whole sufficient to sustain the strength, if the substances introduced had been sufficiently digested and assimilated; but the stomach was filled by degrees with aliment and drink; and which, after being retained a longer or shorter time (from one to eight days,) and having accumulated just to the point of perfect repletion, were returned by a kind of regurgitation in considerable quantity at once. This state was accompanied by obstinate constipation; scanty urine; much emaciation; and pulse from time to time irregularly febrile. On examination by the touch, before vomiting, a soft and flatulent developement of the inferior part of the abdomen was discovered; and percussion used alternately on the two sides of this region produced the equivocal sound of an undulation. On the stomach being empty, the epigastrium was depressed; and the touch did not reveal either well defined indurations, or parts much affected with sensibility. Moxa was applied to the epigastrium; soaps, mercurials, diffusible stimuli internally were administered, and alternated with laxatives, which easily procured alvine evacuations, but without any sensible relief to the stomach. Purgative injections were used to relieve a spasmodic state of the stomach; and narcotics for diminishing morbid sensibility, which at times became exquisite. Some improvement and relief were procured by these means; but nutrition was only feebly maintained, and the patient at length died on the 3d of February 1817, reduced to the greatest state of marasmus, and having preserved his mental faculties to the last.

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[*] Selecta Diarii. Tom. i. an. 1784, Sept. Sect. vi.

[†] Chaussier, Memoire sur les Functions du Grand Epiploon. Mem. de l'Acad. de Dijon, 1784.

Dissection.—The body was opened on the same day. The abdomen presented sensible fluctuation through the greater part of its extent. This space was occupied, as was supposed, by the stomach, excessively dilated. This viscus, distended with fluid and gas, filled anteriorly the epigastric and umbilical regions, and its *cul-de-sac* reposed under the iliac fossa. The liver was nearly natural in colour and consistence, but its volume did not equal the double size of the fist. This extreme diminution appeared to be owing to the contraction or straitened state of its vessels, occasioned by habitual pressure from the developement of the stomach. The gall-bladder was relatively very considerably developed, and contained pale and transparent bile. The pyloric extremity of the stomach, and the commencement of the duodenum, gave the feeling of a hard tumour three inches long; and when this was laid open, a canal two inches and a-half long, and of the diameter of a large writing quill, beginning at the sound part of the duodenum, and opening into the stomach was exposed. Along its irregular passage, which was formed by degenerated mucous membrane, there was neither erosion nor ulceration. The stomach contained gas, fluids, and a portion of aliment, and was capable of holding ten *litres*, or more than twenty wine pints of water. The substance of the viscus was very soft, and easily torn. The muscular fibres were considerably separated from each other. Its mucous membrane was sound, but showed towards the great curvature and *cul-de-sac* some brownish bloody spots, which were only points where the dilated arterial capillaries allowed blood to escape. The spleen, almost glued to the great *cul-de-sac*, was only the size of a small egg. The pancreas was of the usual size, and sound. The intestinal canal was in general narrow. The lungs, compressed for a long time by the volume of the stomach, were, as it were, withered, but sound. The membrane of the pericardium strongly adherent.

The next two cases are related by M. Andral Junior.*

CASE VII.—A woman, aged 65, poor and emaciated, began to show symptoms of an organic affection of the stomach towards the end of June 1821. She had difficult digestion; alternately voracious appetite, and complete anorexia; acid eructations; nausea; frequent vomitings many hours after eating; and pain in the epigastric region. These symptoms increased daily in intensity. The patient entered the Hospital of La Charité in May 1822. She was then reduced to the last degree of marasmus. The stomach could be traced quite across the abdomen, and occupied visibly the greater part of the belly. Its lower edge rested immediately on the pubis. Its diaphragmatic arch described a curve descending from the umbilicus, then remounted towards the right hypochondrium. The patient complained of habitual pain in the supposed seat of the pylorus, which was worse at intervals. She vomited in about forty-eight hours a great quantity of brownish fluid. After vomiting, the tumour formed by the stomach subsided, but did not disappear. The vomiting took place without effort, almost as a simple regurgitation. The patient frequently desired food, but, as soon as she had taken it, the mouth became insupportably bitter. She discharged by the mouth large quantities of gas. The tongue was natural; thirst moderate; motions scanty; pulse frequent and very feeble; skin dry and without heat. The origin of the disease could not be ascribed to any cause. She became rapidly weak, and after being fifteen days in the hospital, her features changed, the pulse ceased to beat, the extremities became cold, and she died in agony, having preserved to the last moment the full use of her intellectual faculties.

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* Observations sur des Dilatations excessives de l'Estomac, sans obstacle au pylore; par M. Andral Fils, D. M., Journal de Physiologie, Magendie, Tome ii. p. 239.

Necroscopic Appearances 22 hours after death.—The organs within the cranium and thorax were sound.

The stomach occupied almost the whole abdominal cavity. It descended first vertically from the epigastrium to the left iliac fossa. It then directed itself obliquely from left to right towards the right iliac fossa. In this interval its great curvature was concealed by the pubis. It then remounted suddenly towards the right hypochondrium. The intestinal canal was concealed by the stomach, with the exception of some portions of the small intestines, which occupied the right flank, and of the iliac portion of the colon. The stomach contained an enormous quantity of brownish fluid, similar to that vomited during life. The internal surface was throughout of a perfectly white colour; but the whole mucous surface was of great softness. Within the length of four finger-breadths on this side of the pylorus the membrane did not exist. Where its solution of continuity commenced, it formed an irregular whitish pulp. The bottom of the ulcer that resulted was formed by a laminous tissue, which was at least four or five times its natural thickness, and of a pearly white colour. Along the same extent there was no trace of muscular fibre. The pylorus easily admitted the extremity of the index finger. The intestinal canal was very contracted, but sound.

Case VIII.—A woman, 23 years of age, had always enjoyed good health, but, from reverse of fortune, quitted the country for Paris, where her health soon sensibly altered. The appetite diminished, digestion became difficult, and toward the month of February 1821, after having suffered from a fright, which produced prolonged syncope, she began to vomit from time to time all her food, solid and liquid. She did not reject it till many hours after eating. She became emaciated, and gradually enfeebled. Leeches were applied to the epigastrium; various antispasmodics and magnesia were administered occasionally. About the month of December, the vomiting became more frequent, the strength rapidly declined. The catamenia were suppressed. The patient's occupations were interrupted, and she entered the Hospital of la Charité on the 14th February 1822. She then presented the following state. The last degree of emaciation; discoloured complexion; vomiting of solid and liquid food, more or less speedily after eating; moderate pain in the epigastrium, which is soft and yielding, and did not present, any more than the rest of the abdomen, any sensible tumour; pulse very feeble, and slightly frequent; skin dry, and without heat; respiration free. The disease did not show any new symptom before the beginning of March. On the 12th of that month, the pulse became more frequent, the tongue dry, and she died on the 14th.

Inspection, 24 hours after death—Head.—A little serosity in each of the lateral ventricles.

Thorax.—Some long and dense cellular bridles united the pulmonary and costal pleuræ. Heart nothing remarkable.

Abdomen.—The stomach, very much dilated, covered the greater part of the abdominal viscera, and only showed some circumvolutions of the small intestines in one and the other flank. Its lower edge touched the pubis. It was the great *cul de sac* which had suffered the great dilatation. The cavity of the stomach was filled with a yellow greenish fluid; its internal surface of a slight rose tinge, marbled or mottled in some parts. On the side of the spleen it was whiter. There was also a space as large as the palm of the hand of the mucous coat, very soft and elevated like a pulp; elsewhere its consistence was natural. The walls of the stomach were in general thin, and easily torn. The muscular coat was remarkable for its great tenuity. The small intestines were contracted, similar to the intestines of a dog; their internal surface pale. The cæcum did not offer any thing remarkable. The ascending colon occupied its usual place. The transverse colon had followed the great curvature of the stomach, and was placed behind it; its internal surface presented, for about four finger-breadths, a red violet colour, seated in the mucous membrane, and a little thickened. Some red spots or stains of the same nature were observed in the descending colon. The whole intestine throughout was strongly contracted. The iliac portion of the colon and the rectum, which showed no alteration, were filled with very hard matter. Many portions of the large intestines were manifestly inflamed. The liver, much enlarged, extended to the left side as far as the spleen; it fell back upon the diaphragm, even to the fifth rib. Its tissue was sound.

Case IX.—Eliza Nairne, aged 19, was admitted into the Royal Infirmary in this city, on the 20th of July 1839, and placed under my charge. On admission, the report of her case is as follows:

This patient has for the last five years been subject to vomiting of large quantities of fluid resembling yeast; there is some emaciation; the countenance is not expressive of organic disease; the tongue is natural; the pulse small, in other respects natural; considerable thirst; the bowels are regular, and stools of natural appearance. No pain complained of, nor excited by pressure on abdomen; no hardness. The fits of vomiting have usually occurred at intervals of two days, and are always preceded by much distension of abdomen, in which fluid is usually felt, apparently in the stomach, which is believed to be of great size. The catamenia have never appeared.

A variety of treatment had been used in this case without any benefit. On admission, animal diet was ordered, with little liquid. Tonics of various kinds and opium were at first employed without apparently any good effects. These were changed for diuretics, under the use of which some amendment took place. The fits of vomiting became less frequent, and the quantity of fluid vomited, which at first averaged seven pounds, was reduced to four pounds. On the evening of the 17th August, alarming prostration of strength occurred, from which she rallied by the use of stimuli; but she sunk on the afternoon of the 19th; no particular change of the symptoms having taken place before death.

It is proper to observe, that on this patient's admission into the hospital, and till the time of her death, she was not much reduced in flesh, but her complexion was pale and leucophlegmatic. She was able to be out of bed, and to walk about the ward.

Sectio cadaveris on the 21st of August.—Abdomen. The stomach was greatly enlarged, filling the whole of the epigastrium, left hypochondrium, a part of the right hypochondrium, a part of the umbilical and iliac regions. It contained air and a large quantity of fluid. All its coats were somewhat thickened, and the mucous membrane mammillated. The first half of the duodenum was much contracted, without thickening or adhesion to the surrounding parts. It admitted barely the passage of a quill. Close upon the pyloric portion of the stomach was a rounded depression the size of a shilling, covered by a smooth membrane, evidently an old cicatrix. The contracted portion of the duodenum, when slit open and stretched out, measured eight-tenths of an inch in breadth. The mucous membrane lining it was smooth, but no distinct cicatrix was observed. The kidneys were healthy, as were the other abdominal viscera. The other cavities were not allowed to be opened.

The Second Series comprises those cases where the coats of the stomach and the pylorus are free, but occasionally with contractions of the intestinal canal.

Case I. Is one related by Morgagni,[*] of a man 50 years of age, much addicted to drinking. He was wont to complain of uneasy sensations in the *scrobiculus cordis.* He was admitted with tertian fever, and on this ceasing he began to vomit his food, and continued to do so during the remainder of his life. What he vomited was only the ingesta, which was destitute of taste or smell, except of Muscatel wine, which he took as a cordial. He became weakened, with much emaciation, and slow fever, and sunk rapidly. He never complained of any pain in the belly in the hospital, nor was there any tumour, All external and internal remedies were tried in vain to restrain vomiting.

The body was examined after death. It was much emaciated. Nothing remarkable in the head, except some effusion in the lateral ventricles. The spinal marrow was much softened. In the abdomen, the intestines, and especially the stomach, excepted, nothing unnatural was found. The intestines here and there had livid stains. The stomach was of surprising length, for, beginning at its usual place, it extended by the left side of the belly even to the pubis, then reflecting upwards and towards the right, it terminated at the duodenum. It was of moderate breadth, and contained nothing but a certain white substance like a pultaceous mass, the supposed remainder of the food.

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[*] Op. citat, Epist. 70, p. 461.

CASE II.—Lieutaud * records the case of a man, 65 years of age, who was received into the Hospital of la Charité in the month of March 1752. He had been a long time cachectic; his legs much swelled; and the abdomen much distended, without, however, any sign of effusion; the respiration free; the pulse feeble and febrile; the urine thick and muddy, small in quantity; and the belly very slow. He complained of weight at the stomach, accompanied with dull pains near its region, which has always been more elevated than the other parts of the abdomen. He had desire to vomit, but neither nature nor art could give him any aid. He took very little food, and was averse to medicine. Nothing that was used for ten months could stop or retard the progress of the disease, which terminated by a universal dropsy with effusion in all the cavities, which was manifest a month before death by oppression and fluctuation in the abdomen—the part that was always more affected. There supervened fifteen days before death an acute pain seated in the lateral left part of the belly, under the crest of the *os ilium*, the cause of which could not be discovered. During the latter time of the disease, the patient took almost no nourishment, although the organs of deglutition were free, saying, that he was full and nothing passed. It required very strong medicine to move the bowels, and the tartarized antimony had no effect in exciting vomiting.

The dissection presented very interesting appearances.

On making the ordinary incision of the integuments and muscles of the abdomen, there was discovered on the left side, which was the seat of the pain before-mentioned, a pouch much extended, and situate betwixt the *obliquus externus et internus*, and formed by the recession of these muscles. It contained more than two pounds of grumous blood, of a lively red, such as would be an hour after blood-letting. The abdomen contained about two or three pints of fluid. The state of the stomach and bowels principally fixed our attention. The former was extremely distended, and was filled in proportion, although the patient for some time had taken very little food. The intestinal canal was much contracted, so that all the bowels together did not surpass the size of an ordinary stomach. It was supposed that some obstruction existed in the pylorus; but on close examination, this opening was found perfectly free throughout, as in the natural state.

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* Memoires de l'Academ. des Sciences, 1752, p. 223.

Case. III. is given by Mr Anderson,[*] Surgeon, Leith, of a man about 40 years of age, by trade a weaver. He had for a considerable time complained of want of appetite, indigestion, flatulence, and pain in the bowels. In February 1766, he was attacked with obstinate costiveness, which was with difficulty removed. After this he continued in his usual state of health till about the middle of July. He had then a return of the costiveness, attended with violent vomiting. The costiveness was again removed by proper remedies, upon which the vomiting ceased. But afterwards, he had a periodical return of vomiting every evening between 8 and 9 o'clock; and he never had a stool without the assistance of an injection, which he got regularly every second night. In this way he continued to linger till he died.

On opening the body, the preternatural structure which was discovered was of a singular nature. When the abdominal integuments were laid aside, a large plain surface, extending from the sternum to the pubis, and from one side of the abdomen to the other, was exposed to view. This uncommon appearance surprised those who were present; nor was the surprise diminished, when, upon examination, it was found to be the stomach enlarged to such a size as to fill the whole abdomen. Its fundus descended so far as to fill the pelvis. Here the small intestines were entirely lodged. They were closely pressed together, and quite empty. The *caput coli* was in its natural situation, but, as well as the whole curvature of the colon, was covered by the stomach. The colon at the sigmoid flexure was very hard and much thickened, so as greatly to straiten the canal. For about three inches in length, it was not wider than a goose-quill. Every other part of the intestines appeared to be in their natural state; and no scirrhus could be discovered in any other viscus.

Case IV.—Professor Valentini[†] of Rome relates a case of enlargement and dropsy of the stomach in a youth of 20 years of age, of a delicate constitution, who, in attempting to climb a tree, fell from a considerable height, and received severe contusions on the back and loins. In a few days he became unable to digest his food, which, both solid and liquid, was rejected by vomiting, so that in a short time he was confined to bed from exhaustion. After two months, he was attacked with intermittent fever, when he was visited by Dr Valentini, who remarked anxiety, want of sleep, a sense of weight, and some degree of pain in the epigastric region. After the fever had assumed a mild character, great distension of the stomach took place, beginning from the epigastrium, with constant vomiting of a serous blackish fluid. The patient died in the course of two months from the first appearance of the fever.

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[*] Edinb. Med. and Philos. Commentaries, Vol. ii.

[†] Institut. Med. Pract. de Retentionibus, Vol. vi.

On examination after death, the whole of the viscera were found in a natural state, except the stomach, which was enormously distended and relaxed, and contained about thirty pounds (22½ of 16 ounces each,) of the same blackish fluid that was rejected by vomiting during life.

Case. V—M. Duplay,[*] in an ingenious paper on enlargement of the stomach, which is substantially stated in the Cyclopædia of Practical Medicine,[†] gives the following case of a man, 54 years of age, who was received into the hospital under the charge of M. Rayer.

He presented symptoms of hypertrophy of the heart; occasional vomiting; dull pain in the epigastric region; some appetite; tongue natural. The disease of the heart, which was far advanced, chiefly fixed the attention. The patient died a short time after his entrance into the hospital. Next day dissection showed the following alterations.

Thorax.—Much effusion of serum into the right cavity. The costal pleura towards the superior and inferior parts of the cavity covered with a false membrane. The lung of the same side reduced one-third of its volume, and strongly pushed upwards. The superior part presented a large quantity of miliary tubercles. The left cavity of the chest sound, except the inferior part of the lung, which also contained numerous miliary tubercles. The heart of an enormous size; the hypertrophy occupied chiefly the left ventricle; the wall seven lines in thickness, and the cavity of the ventricle considerably contracted.

Abdomen.—The stomach was found of an extraordinary dimension, and occupied the whole of the abdominal cavity and concealed the intestines. It represented a sort of crescent, one of the horns of which was placed in the inferior part of the left hypochondre; the other remounted into the right. The large and small tuberosity could not be distinguished in the great curvature, which descended to within the hypogastrium, and behind the *symphysis pubis.* The cardiac and pyloric orifices approached each other, and were on the same level. The small intestines were pressed back behind, and in the pelvis, by the enormous volume of the stomach The great curvature of the viscus from the cardiac to the pyloric orifice measured thirty inches. The little curvature, which was five inches, presented a very morbid incurvation, and which allowed the two orifices to approach each other. From the middle part of the small curvature, to that of the great, the anterior part measured vertically was seven inches. The stomach contained a pint of greenish fluid. The cardiac and pyloric orifices were perfectly sound; the latter preserved its dimensions, and natural formation. The mucous coat presented here and there some red livid spots, but without any trace of ramollissement.

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[*] De. l'ampliation morbide de l'estomac. Archives Generales de Medecine, 2d Series, Tom. iii. October and December 1833.

[†] Vide Supplement, Vol. iv. p. 665.

The Third Series consists of the following collection of cases, but which lose much of their interest from their being so imperfectly stated.

Case I. is given by Blancard.[*] A female had fever, much thirst, restlessness, and pains in the whole body. She had also aversion to food; was reduced to extreme emaciation; and after a year or two, her belly was distended to an enormous degree.

On dissection, the parietes of the stomach were found greatly dilated, and an immense quantity of fluid was collected.

II.—Heister[†] relates a case of an enlargement of the stomach in a house dog of the middle size, which on dissection was found to extend from the thorax to the hypogastrium. It so filled the whole of the abdomen that the intestines only occupied four fingerbreadths about the pelvis. It was tense and expanded like a drum, and filled with food, and when emptied of its contents could contain sixteen pounds of water.

III.—Hieronymus Laubius[‡] mentions a case of surprising distension of the stomach in a robust sailor, 30 years of age, a habitual drunkard. It was four large hand-breadths in length, and two in breadth; its interior was covered with a mucous substance, which, being scraped off, many blackish stains were apparent. It as well as the small intestines contained a portion of brown and very fetid fluid. The large intestines were distended with fæces and flatus. The rest of the viscera were sound; but the gallbladder contained no bile. It is to be observed that this subject had become rapidly decomposed.

IV.—Morgagni[§] gives a case of a woman, 40 years of age, who was subject to hysterical affections; paroxysms very severe. She began to show a depression in the epigastrium, with a swelling in the hypogastrium. This often changed in the course of a day, and became suddenly collapsed. At the interval of four or five hours, she had severe pains and gripings, and oppression of spirits. She often complained that all her bowels were fallen from their place. She had constantly vitiated secretions; was feverish, and greatly emaciated. She lived thus three months. In the body was found what Valsalva had predicted on consultation. The stomach had extended into the hypogastrium, so that scarcely four finger-breadths intervened betwixt it and the pubis.

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[*] Anatom. Prael. Bonet. Sepulchret. Obs. 30.

[†] Observ. Academ. Leopold. Cent. 7, Obs. 71.

[‡] Ibid Cent. 10, Obs. 85.

[§] Epist. Anatom. Med. xxxix. Art. 14, de Morbis Ventris, Lib. iii.

V.—Morgagni here quotes a case from the *Bibliotheca Anatomica*, of a young woman whose stomach was so much distended, that its whole fundus was in the hypogastrium.

VI.—In another from Valsalva, a woman was seized suddenly, after a copious repast, with pains in the epigastrium, and she died in a very short time. On opening the body, the stomach was found distended in a remarkable manner, and presented traces of inflammation.

VII.—"A young man," says Lieutaud, "of very delicate health, experienced suddenly after eating, great difficulty of respiration, and considerable swelling of the belly. He died almost instantly. The stomach was found of a volume so considerable, that it not only occupied the whole belly, but likewise a great part of the chest. The lungs were partly destroyed by suppuration. The heart was small. The liver descended very low. The spleen was very small; and there was no trace of the epiploon."

VIII.—In another case of a woman who was hypochondriac, and who had heat, dryness of the hands, difficulty of respiration, want of appetite, and constant eructations, the stomach after death was discovered to be very large, and filled with black blood.

IX.—Besides the above, Lieutaud* has recorded some cases of enlargement of the stomach, chiefly quoted from other authors. In one, the case of a woman, who appeared to have died of intestinal strangulation, the stomach was found so distended, that it was at least six times its ordinary size. The intestines were extremely dilated.

X.—Professor Christison favoured me with the short account of this case, which he received with the preparation from Dunfermline. The patient had long complained of dyspeptic symptoms, and had vomiting of a brownish fluid. The stomach was found greatly enlarged. The following are the dimensions: Along the greater curvature from the cardiac to the pylorus, 3 feet 8 inches; along the smaller, 15 inches; round the cardiac end, 20 inches; at the middle, 18, and at the pylorus, 12 inches. It required 16 English pints of water to fill it.

OBSERVATIONS.

We have remarked, that, along with this enlargement of the stomach, there is sometimes a diseased state of its coats, and of the pyloric region, with contractions in some parts of the intestinal canal, and an effusion of fluid, occasionally to a great extent, into the cavity of the viscus, while at other times, but rarely, the organ is empty. We have observed also, that the enlarged stomach may be free from disease, and the pyloric orifice quite pervious, and in its natural state, and in such cases the viscus may be equally distended with fluid, or empty, as in the instances now recorded.

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* Hist. Anatom. Morb. Obs. 21, 22, 23, and 25.

In the first series of cases, we have found, 1*st*, altered structures or disorganization of the coats of the stomach, some of these of several years duration, and varying almost in every instance. In Case I. the coats of the stomach were not thicker than a sheet of paper. They were thickened towards the pylorus, but the pyloric orifice was free. In Case II. the pylorus, though sound, was obstructed by an oblong cyst, which passed into the duodenum. The external membrane of the stomach was covered with numerous hydatids; the two orifices approached very near each other, as in Case V. of second series. In Case III. the pylorus was thickened and contracted, being altogether surrounded by a cartilaginous ring. The large intestines much contracted. In Case IV. the right extremity of the stomach was contracted for about a handbreadth near the pylorus. The substance hard throughout the whole circumference, and of a finger-breadth in thickness. The pyloric opening much straitened, though pervious. Many glands of great size, and a number of nuclei in the external surface. The intestines greatly contracted. Case V. pylorus scirrhous and cartilaginous. Case VI. the pyloric extremity of the stomach, and the commencement of the duodenum hard, and the canal contracted for two inches and a-half to the diameter of a large quill. The substance of the stomach was soft and easily torn, and the muscular fibres much separated. In Case VII., the internal surface was a perfect white, and the whole mucous membrane of great softness, and within a certain space from the pylorus it was awanting. Here there was an irregular whitish pulpy raised substance. Ulceration had followed. There was no trace of muscular fibre at this part, and the intestinal canal was contracted. In Case VIII. some discoloration of internal surface; a part of the mucous coat, as large as the palm of the hand, very soft, and elevated like a pulp; the parietes of the stomach generally thin, and easily torn. The muscular coat remarkably attenuated, and the intestinal canal contracted. These two cases, therefore, resemble each other. In Case IX., which fell under my care, the coats were somewhat thickened, the mucous membrane mammillated, a cicatrix was discovered in one place, and the duodenum contracted.

Second Series. We find that in all the cases the stomach was sound, and there was no difference in any of the coats or the openings from a healthy state of these parts; for although in some of the cases the appearance may not be fully given, yet, inferring from the general reports of the condition of the organs, we must conclude that no disease existed, except in Cases II., III., and V., in which the intestines were in some parts much contracted.

In the Third Series, we have too limited an account of the various cases from which to draw any inferences as to the actual state of the stomach, except its preternatural enlargement.

Some authors have attributed this enlargement of the stomach, with its great accumulation of fluid, simply to a gradual collection of ingesta of liquids and solids, which the viscus, from its diseased state, cannot transmit in the usual way; and hence it becomes distended or dilated in an extraordinary degree.

Others, as Frank, Valentini, &c. consider this morbid condition as a dropsical affection, and proceeding from the same causes as effusion into the serous cavities.

This anormal state of the stomach, which renders it unfit for the performance of its usual functions, has been divided into three conditions:

1. Scirrhus and obstruction of the pyloric opening, and thickening of the surrounding portion.
2. Diseased state of the membranes, particularly of the muscular coats, which are hypertrophied or attenuated.
3. Paralysis of the coats, when these are otherwise found to be in a sound state.

Chaussier, Duplay, and others have ascribed this disease of the stomach, and the great accumulation of fluid, chiefly to the first of these conditions, whereby the contents of the viscus are prevented from being carried forward into the intestinal canal. But on examining the cases which we have related, and these, we may observe, constitute by far the greatest part, if not the whole, that have been recorded, we shall find that only in Cases II., III., IV., V., and VI. of the first series, five cases in all, had the diseased or obstructed state of the pyloric region existed. In the greatest number of cases this opening presented no obstacle to the free transmission of the chymified aliment into the duodenum.

Again, this morbid condition of the stomach has been attributed by others to a diseased, overdistended, or attenuated, state of the coats, which prevents the organ from exercising its contractile power in propelling forward the contents with sufficient force to overcome the natural resistance of the pyloric orifice; for in order that the prepared alimentary matters may pass from the stomach into the duodenum, it is necessary that the muscular fibres, especially that portion near the pylorus, should enjoy their healthy state. But it is to be remarked, that such conditions of the coats have only been found in seven of the cases enumerated in the first series; and the three last of these are included in those with pyloric obstruction. Besides, if we reflect farther on the numerous cases, both of scirrhus of the pylorus and its adjoining region, and the chronic diseases to which the coats are subject, without any such enlargement or collection of fluids occurring, we shall come to the conclusion that we must look for other causes for this anormal condition of the organ in the instances before us.

We have also to observe that, independent of the limited number of cases with obstructed pylorus, or diseased state of the membranes of the stomach, there are others in the Second Series, where the pyloric orifice and the coats of the viscus were in a perfectly natural state ; and some of these were of the largest dimensions, and the accumulation of fluid greatest. Here, then, is the absence of all lesions capable of explaining the dilatation of the stomach. The pylorus is free, and the coats of the viscus do not show any disease. In such cases, a cause has been sought for, in some supposed defect or paralysis in the nervous apparatus, analogous to that which takes place in paralysis of the bladder. But as in most of these cases to which we have alluded, vomiting had constantly taken place, the coats of the stomach could not have lost their contractile power, unless we believe that the action of the abdominal muscles is sufficient for the expulsion of the contents of the stomach, without any assistance from the muscular coat of the organ itself. But supposing that such were the case, we may not admit a similarity betwixt the bladder and stomach, in regard to the peculiar functions of each. It is true, they both resemble each other in being receptacles for matter received into their cavities, to be transmitted into other canals. They have a similar apparatus of membranes for this purpose, equally capable of contractility and expansion ; and when any obstruction prevents the exit of their contents, each viscus will be dilated till nature or art relieves it from the accumulated fluid, or fatal consequences must soon follow. But, in other respects, there is a great difference betwixt the functions of these two organs ; for while the bladder is, as it were, a proper recipient of the urinary secretion, the stomach has important functions to perform in the process of digestion, through which it must stand in a different relation in many respects in the animal economy. And without venturing an opinion on the idea entertained by some authors, as Itard,[*] Andral, Frank, and others, that this affection should be classed among dropsical diseases, we may remark, that we do find in many of the cases such pre-existing lesions, resulting from subacute inflammation of the parts, similar to what we find accompanying effusion in other cavities and tissues, and which, in the cases now before us, we should expect to affect the balance of the circulation. We may here remark the case of hydatids, which is a legitimate cause of effusion in some dropsical affections ; and although we must admit that the liquids received into the stomach will add to the accumulation, yet we cannot deny that, under the above-mentioned circumstances, the secreting and absorbing powers of the stomach may be morbidly increased or much retarded, and that, from one or both causes, the quantity of fluid will be much augmented.

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[*] Dictionnaire des Sciences Medicales, Tome xxii. p. 424.

We have observed, that, in a great proportion of the cases recorded, contractions of some parts of the intestinal canal presented themselves more frequently than any other lesion of the stomach, —these may have acted so far as an aggravation, by preventing their due action and propelling powers, and also by exciting an antiperistaltic motion of the intestines.

Upon the whole, we are disposed to consider this enlargement of the stomach, with its great accumulation of fluid, as depending rather on a peculiar state of the system, implicating the functions of life, and particularly of the vital action of the viscus itself; and, considering the position of the organ in its relation with the animal economy, and in its peculiar vital properties, we may remark, that, in certain conditions of the system, original or acquired, or of the blood itself, as in some of the cases above-mentioned, where the fluid in the stomach was of a dark colour, and this, independent of any scirrhus or diseases of the coats, there may occur circumstances which will promote the accumulation of fluid within its cavity, and the preternatural enlargement of the viscus, in which the lesions above-mentioned may be considered as concurrent causes.

It is to be regretted that the state of the urinary secretion has been so much overlooked, as we find it only mentioned in three of the cases. In all of them it was deficient in quantity.

We do not here take into consideration the enlargement of the stomach, which is sometimes met with in gluttons and maniacs, from over-eating, and in certain cases, where a habit has been acquired of drinking large quantities of fluid; for in such instances the causes are sufficiently obvious to require any comment.

Diagnosis.—It is of importance to be able to distinguish well this affection of the stomach from other enlargements to which the abdominal cavity is liable; as it has been mistaken for ascites and encysted dropsy, and even confounded for a time with pregnancy itself.

In ordinary cases it will not be difficult to detect the nature of the disease, although it may happen, from the displacement of the stomach, and the new relations which are established among the abdominal viscera, and perhaps from disease of these also, that the practitioner may find himself embarrassed, especially when there has been no evidence of the march of the disease.

On examining the cases which we have related, we shall find that the following symptoms were generally present, although it is to be regretted that so little is known of the rise and progress of the disease, until it was far advanced, or even suspected. Indeed in many of the cases, the real character of the affection was not discovered till after death.

The symptoms that seem to have accompanied the commencement of this enlargement, were those of indigestion, such as flatulence and eructations, occasional vomiting, irregular appetite, sometimes nausea, and pain or uneasiness in the epigastrium, constipation, or all the usual symptoms of scirrhus of the pylorus, chronic gastritis, or neurosis of the viscus, with general progressive emaciation. But when the great enlargement of the stomach, with the usual copious accumulation of fluid is established, we can readily ascertain it by the following signs.

Tension or Swelling of the Belly.—When the patient is examined in a horizontal position, the tumour is found extending from the left false ribs, to the right iliac fossa, of the shape of a marked oblong protuberance. When the patient is in the vertical state, the epigastrium is less prominent than the part of the abdomen lower. The swelling or tumour gives throughout a sensation of fluctuation. The size of the tumour or distension of the belly will depend on the extent of the enlargement of the stomach, and its consequent descent, which may be so low as to reach to the pubis. The nature of the protuberance is soft and yielding, and seldom or never presents any hardness, except when complicated with other diseased viscera, which is seldom the case.

Vomiting.—This is a constant symptom. It consists of fluids alone or mixed with aliment. It may return at periods varying in time from several times a-day, to every two, three, or four days, or even as long as once a-week. It is often preceded by a sense of fulness, and is followed by marked relief, and with sudden diminution of the volume of the belly. Sometimes the vomiting is a kind of regurgitation, and the quantity discharged thus at once is very great. The stomach, however, is never completely emptied of its contents. The vomitings sometimes become less frequent towards the conclusion of the disease, but in general they are more frequent. The colour of the fluid rejected in the majority of cases was dark, and this happened where there was no disease of the coats of the stomach or the pyloric region.

Great Emaciation.—This almost constantly happened as the disease advanced. It facilitates much the diagnosis, as the enlarged stomach can more easily be traced through the parietes of the abdomen along its course.

In this advanced state of the disease, there were also a sense of weight and oppression in the epigastrium, and occasionally pain in that region.

In the cases where the tongue was examined, it was very little changed, generally pale; the pulse was feeble and irregularly febrile; and the appetite variable.

M. Duplay has given directions for the external exploration of the abdomen in this disease, which have been quoted in the article in the Cyclopædia of Practical Medicine already referred to. These include the different modes of examination by the touch, pressure, percussion, and the ballottement. The most certain sign in the latter, which is performed by the aid of a hand placed on heach side of the abdomen ; and gives a particular sound similar to that from a bladder half filled with air and water.

By the signs we have indicated, we can readily distinguish the enlargement of the stomach from other tumours or swellings in the abdomen. We may not confound it with ascites, as the swelling of the abdomen does not proceed in the same manner. In the enlargement of the stomach, it advances from the superior to the inferior part of the belly. The fundus of this viscus, which contains the liquid, descends from above downwards ; but in ascites, the fluid accumulates first at the hypogastrium, toward the lower part of the flanks ; and it is here the irregularity is met with. The intromission in the volume of the abdomen, which coincides with the repletion and depletion of the stomach, will also assist in establishing the differential signs of these two affections.

Besides the characters that are proper to encysted dropsies, they can easily be distinguished, also, by the above signs, which we may consider pathognomonic of the affection of the stomach.

Pregnancy cannot be confounded with it, except through great ignorance, or carelessness. The form of the abdomen and the progress of its increase. Auscultation, which makes known the pulsation of the fœtus, or the bruit of the placenta ; the internal touch, which discovers the state of the uterus, and the other sympathetic signs of pregnancy, are all opposed to an error of this kind.

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Treatment.—From the obscurity of the affection at the beginning, the very gradual manner of its progress, or the lateness of the period at which the patient has applied for assistance, the opportunity is commonly lost for arresting the disease. No permanent aid can indeed be expected from medicine, when it has been so long established ; for what can we do where the enlargement of the stomach has taken place to a great extent, especially when there are indications of disease of the coats of the viscus ; and where the powers of the constitution have become so much exhausted ?

If we find the patient's strength not greatly impaired, and if there be pain in the epigastrium on pressure, a febrile state of pulse, and furred tongue, the antiphlogistic regimen should be strictly enforced ; topical bleeding, according to the degree of local pain, or the strength of the patient ; a succession of blisters, or the application of moxa to the epigastric region ; and the use of mild laxatives, alternated with injections to open the bowels freely.

Where there are no symptoms of local inflammation in the region of the stomach, tonics should be given, such as light bitters, subnitrate of bismuth, &c. and gentle aperients and injections; animal diet, restricted in quantity, and a rigid abstinence from liquids; anodynes to procûre rest, and to relieve distressing and uneasy sensations. Bandages have been recommended to give support and tone to the abdomen. Diuretics are worthy of notice, where there is great accumulation of fluid, since, by promoting the action of the kidneys, the stomach may be much relieved, as in dropsical affections.

But in such unpromising cases we cannot look for any lasting amendment. The patient, after a long state of suffering, sinks at last under the protracted disease, and want of nutrition; and it is remarkable to observe how rapidly and suddenly death sometimes closes the distressing scene, without any previous marked change in the symptoms.

ART. IV.—*Observations on the Oil contained in Ergot of Rye.*

By SAMUEL WRIGHT, B. A., V. P. C. S. E., M. S. A. F. R. B. S. Extraordinary Member, and lately Senior President of the Royal Medical, Royal Physical, and Hunterian Societies of Edinburgh, Honorary Member of the Metaphysical Association of Glasgow, and of the Physiological Society of Montpellier. (Continued from Vol. liii.)

SECTION XIII.—*Preparation of the Oil of Ergot—its Physical and Chemical Properties, &c.*

IF ergot of rye, in a state of fine powder, be heated in a retort, there distils over, a thick oily matter, having an offensive smell, a bitter acrid taste, and a colour varying from a light brown to a perfect black. This is the oil of ergot in an empyreumatic form, and the characters above expressed, are strong in proportion to the heat employed. It was thus separated by Vauquelin, and was consequently described by him as thick and rancid, having the appearance of fish-oil; properties, which, as will shortly be seen, belong not to it in its natural condition, and are only produced by its partial decomposition.

Another way in which this oil may be obtained, is by squeezing the ergot (previously reduced to powder, and placed in a canvass or a muslin bag) between two plates of iron, heated to the temperature of boiling water. As thus separated, the oil is more fluid, lighter in colour, and less offensive to the smell, than when prepared in the manner first described.

A third process, and a convenient one for ordinary purposes, is to digest the ergot in *liq. potassæ* at a temperature of 120°—150°, until a perfect saponaceous solution be formed. The liquid is then to be diluted with half its weight of water, exactly neutralized with sulphuric acid, and submitted to distillation from a saline or an oil bath. The product is white, adhesive, and fatty-looking, almost free from empyreuma, and nearly tasteless.

It may also be separated by digesting ergot in alcohol for some days, filtering the fluid, and then allowing it to evaporate spontaneously. The oil thus obtained, however, is not pure, owing to the alcohol being an active solvent of the osmazome and colouring matter.

The readiest and best, though unfortunately, the most expensive way of obtaining this oil, is by percolating ergot in a state of fine powder, with sulphuric ether. By allowing the ether to evaporate spontaneously, the oil of ergot is left in its purest form.

As thus prepared, it usually consists of two portions—the one, colourless and translucent, the other, having a reddish-brown hue. The latter character is an acquired one, and simply dependent upon the age of the ergot. In old specimens, the oil is coloured throughout, and often deeply; in recent ones, on the contrary, it is not unfrequently entirely free from colour.

Its taste is oily, and slightly acrid, its odour is similar to that of ergot, though more agreeable, and neither heightened by acetic acid, nor destroyed by long contact with a clear plate of copper or of iron. When heated, it blackens rapidly, acquires a disgusting empyreumtic odour, like that of an old tobacco pipe, and an acrid biting taste. If the heat be long continued, complete volatilization takes place; but if the oil be suffered to cool, it thickens, solidifies slowly, and ultimately becomes resinous.

By long exposure to light and air, at a moderate temperature, it assumes a reddish-brown colour, though it is little altered in either smell or flavour. The purple hue of ergot appears to be owing to the action of light and air upon the oil, aided by the free phosphoric acid. By mixing the colourless oil with flour and a little acid, and exposing the mass to air and sunshine for some weeks, I have succeeded in producing the distinct colour of ordinary ergot. It will be remembered that the latter, when growing, is never darkened so long as it is completely shielded by the glume.

Oil of ergot is of less specific gravity than water, and when these are agitated together, the latter becomes slightly odorous, and the former is rendered somewhat opaque. It is soluble in all the ethers, alcohol, naphtha, and bisulphuret of carbon, from which it is imperfectly separated on the addition of water. It is dissolved by all the essential oils, and mixes intimately with some of the fixed ones, particularly almond and olive oil. It is likewise soluble in creosote, caustic alkalies, earths, and ammonia. With the latter substances, it forms a soapy solution, from which it may be separated by an acid. Sulphuric, nitric, and hydrochloric acids in the dilute form, have little action upon it, but, when concentrated, they convert it into a deep-brown or black mass. When long exposed to light and air, at a moderate temperature, the oil thickens, deepens in hue, and diminishes in strength; yet, if kept in a stoppered bottle, it is patient of preservation, and will retain its activity for years. On this account, as also from the fact of its embodying all the active properties of ergot in a safe and manageable form, I am persuaded it will be found a much more advantageous officinal preparation than the crude drug.

As will be seen in the experiments next recorded, whatever of activity is possessed by ergot, is centred in its oil; whether this oil be the active principle, or the mere vehicle for containing it, has yet to be proved. From some experiments which I have lately performed, I am inclined to the latter opinion; but my observations being yet incomplete, I shall defer their publication for the present.

SECTION XIV.—*Experiments illustrative of the Physiological Action of the Oil of Ergot.*

Expt. I.—Three drachms of the oil of ergot, obtained by the spontaneous evaporation of its ethereal solution, were diffused through half an ounce of water, at temperature 98°, and then injected into the right external jugular of a terrier dog, weighing thirteen pounds. The fluid had scarcely passed, when the heart's action became excessively violent, urine and feces were discharged in abundance, and the abdominal muscles underwent strong convulsion, in which the whole frame shortly participated. When one minute and a quarter had elapsed, the action of the heart became less urgent, and the respiration was very slow and profound. The pupil then contracted; the eye became fixed; hiccup prevailed; the convulsive motion subsided into a quiver of the whole frame; the animal cried loudly, then sunk into calmness, and in three minutes and a-half ceased to live.

Autopsy.—All the voluntary muscles were highly sensible of galvanic influence, as also the diaphragm and intestines, the vermicular motion of which, though beautifully performing when exposed, was much increased by the stimulus of the pile. The heart was firm and rigid in its texture, but no renewal of its contractions took place when it was scratched with the scalpel, or subjected to the influence of galvanism. The right auricle contained a little fluid blood; that, in the left cavities, was coagulated. All the thoracic and abdominal viscera had a natural aspect. The membranes of the brain were slightly injected, but its substance, as also that of the spinal cord, displayed nothing remarkable.

This experiment was witnessed by Dr Tancred, in whose presence I performed a similar one on the following day, which resembled the former so closely, as not to require a separate detail.

Expt. II.—One drachm of the oil of ergot was diffused through two ounces of water, and then slowly injected into the left external jugular of a mongrel dog. There was a momentary quickening of the heart's action, which was attended by a very feeble quiver of the whole frame; the animal fetched a deep sigh, and at the same instant, his pupil slightly dilated. When a minute and a half had passed, the heart was observed to be feeble, slow, and intermittent in its action, with deep and interrupted respiration.

This state continued until the lapse of twenty-one minutes, when general paralysis prevailed; the animal was totally unable to move, and was insensible to punctures, in whatever part they were made.

Gradually, heart's action diminished in force and frequency, the surface of the body was universally cold, though the limbs were perfectly supple and pliant, respiration subsided into an occasional gasp, occurring about every three minutes, until, at length, two hours and forty minutes from the commencement, life became extinct.

Autopsy.—No part of the body was sensible to the stimulus of galvanism. Even the diaphragm was unaffected by it. The heart was filled with blood, in which there was no distinction in colour between arterial and venous. The lungs were dark and frothy. The brain was slightly congested on its surface, and at its base was a little bloody serum; but the spinal cord was natural throughout. The blood did not coagulate, and the body rapidly decomposed.

Expt. III.—Two drachms of the oil of ergot, diffused through half an ounce of water, were injected into the right common carotid of a terrier bitch, weighing eleven pounds. Immediately upon its introduction, she cried, and struggled violently, the pupils contracted instantly, and in a few seconds the mouth was filled with foam. When three-quarters of a minute had elapsed, she became calm; the muscles were flaccid and powerless; the eye was fixed; the heart's action was imperceptible; and an occasional gasp was the only indication of life's continuance. At the expiration of two minutes and a half, the pupils dilated, the heart throbbed violently, and the whole frame quivered, though respiration still remained indistinct. At the end of three minutes and a-quarter, the tail began tremulously to move in various directions; it was at length drawn rigidly towards the back, in which position it was retained for a few seconds, when it again relapsed, and never stirred more. When four minutes had elapsed, the pulsations of the heart were barely perceptible, and respiration was totally indistinct. At the termination of another minute, there was a slight twitching of the abdominal muscles, in which the whole frame shortly participated; suddenly, it was checked by a deep sigh, which terminated the animal's existence.

Autopsy.—The mouth was very livid and frothy. The conjunctiva was deeply injected. The pectoral muscles contracted powerfully when cut, as also the abdominal ones. The heart was insensible of stimulus; it contained venous-looking blood in all its cavities; the right ones, with the two cavæ, were much distended; the left contained but a small quantity of blood. The lungs were congested, and very dark-coloured. The stomach was distended with flatus, but its lining membrane was natural, which appearance distinguished the whole intestinal canal. The bladder was extremely contracted, and so hard, as scarcely to be indented on pressure. The *dura mater* was marked by deeply injected vessels, and occasional extravasations of blood were met with throughout the substance of the brain. The lateral ventricles were nearly filled with bloody serum. The spinal chord was natural throughout.

This experiment was witnessed by Mr Walker, surgeon.

Expt. IV.—One drachm and a half of the oil of ergot, diffused through half an ounce of water, were rapidly injected into the common carotid of a spaniel dog, weighing twenty-six pounds. In a few seconds, the pulsations of the heart became excessively violent, respiration being hurried and laborious. Shortly, the heart's action was rendered intermittent, and at last was scarcely perceptible. Urine and fæces passed involuntarily, and the pupil dilated widely. When two minutes had elapsed, he yelled loudly, and violent spasms of the hind-legs came on, which also prevailed, though in a milder degree, in the fore ones. In six minutes, slight reaction appeared, the pupils became sensible to the influence of light, the motions of the heart were audible, though an occasional convulsive gasp was the only respiratory movement. The diaphragm and abdominal muscles were now convulsed, and the jaw was spasmodically drawn down; yet the animal was incapable of voluntary movement, and totally insensible of punctures, wherever they were made. In this state he continued for a few more minutes, and then, with a convulsive struggle, he died, having survived the injection fifteen minutes and a half.

Autopsy.—The muscles of voluntary motion were acutely alive to the stimulus of galvanism, the heart slightly so, but the diaphragm not at all. I have often known the diaphragm to be excitable when other parts were not; but this is the only instance in which, without any convulsion of it during life, I ever observed the converse. The heart contained venous-looking blood in a state of coagulation, in all its cavities. The lungs were congested, and the bronchial ramifications and trachea were almost filled with frothy mucus. The membranes of the brain were rather deeply injected, but neither effusion nor extravasation was discoverable.

To determine whether the mechanical influence of the oil at all affected the results, I injected three drachms of olive oil into the jugular vein of one dog, and a similar quantity into the carotid artery of another. There were no appearances at all correspondent with those which marked the previous experiments. In each case, life was prolonged for above eighteen hours; the symptoms resembled those of asthma, and death at last appeared to result from asphyxia, caused by impeded circulation in the lungs. The autopsies fully justified this conjecture.

From these experiments it will be evident, that the action of oil of ergot, when injected into the arteries and veins, is precisely that which characterizes an infusion of the crude drug. There is exactly the same influence exerted upon the brain and spinal chord; subject to all the modifications which attend dilute and concentrated doses. An infusion of ergot when injected into the arteries or veins, has sometimes the singular effect of morbidly increasing instead of diminishing sensibility. This curious property is occasionally manifested by the oil, as shown in the following example.

Expt. V.—In the presence of Mr John Wright, surgeon, I injected two drachms of the oil of ergot, diffused through an ounce of water into the jugular vein of a mongrel dog, weighing fourteen pounds. During the transmission of the fluid, he cried loudly, and struggled with much violence, but shortly afterwards became still. In two minutes, the heart's action was greatly increased, respiration being correspondently hurried. In five minutes the pupil was contracted, conjunctiva reddened, mucus discharged in abundance from the nose, and much foam was collected in the mouth. In eight minutes, the pupil was widely dilated, strong muscular contractions became evident in the hind legs, and the tail twitched convulsively towards the back. He was totally unable to rise, but occasionally made an attempt to do so. When half an hour had elapsed, very increased sensibility of the hind legs came on, in which the tail subsequently participated. The slightest touch upon either of these parts caused a violent convulsive start, and an accompanying yell. Independently of being touched, or even approached, the hind legs would suddenly start, the tail being simultaneously twitched towards the back. This symptom occurred about every three minutes for an hour and a-half, when it subsided considerably. At the end of two hours, the dog was able to raise himself upon his fore-legs, but he had no command over the hind ones, which, when touched, retracted spasmodically as before, and with the production of equal suffering. When six hours had elapsed, he was considerably improved, yet could not walk many steps. On the following day, he was still better, though he was remarkably weak, nor did he thoroughly regain his strength until after the lapse of a fortnight.

I have produced once again, similar effects by injecting the oil of ergot into the veins, and it is very remarkable, that in all such cases, whether arising from an employment of the oil, or the infusion of ergot, the animals have recovered, although in some instances the preparation has been very strong.

As the following cases illustrate, the physiological action of the oil of ergot, when taken into the stomach in either solitary or successive doses, is precisely that of the crude drug, with the exception of the former possessing greater activity, in consequence of its extreme concentration.

Expt. VI.—Thirty drops of recently extracted oil of ergot were poured down the throat of a young blackbird, three weeks old. In four minutes, it lost entirely the use of its legs, fell on one side, and gasped as if suffocating. In about twenty minutes, it revived a little, but was still unable to walk. In this state it continued during the further space of three hours and a-quarter, when it died, without exhibiting any remarkable symptoms immediately antecedent to death, or any morbid appearances afterwards.

Expt. VII.—A drachm of the oil of ergot was given to a kitten three weeks old. It was retained for sixteen minutes, and was then vomited pretty severely. Nevertheless, when half an hour had elapsed, the heart was observed to have become very feeble and intermittent in its beats, the hind legs were in a state of imperfect paralysis, and the sensibility of the whole frame was much diminished. Unfortunately, during my temporary absence, the mother found it and carried it off, so that I was unable to satisfy myself of the results.

Expt. VIII.—Four drachms of the oil were passed into the stomach of a bull-terrier puppy, five weeks old. In a few minutes after having received it, he began to whine plaintively, and at the end of a-quarter of an hour, attempted to vomit, but discharged nothing. When half an hour had elapsed, his limbs were almost powerless, and the heart's action was fluttering and indistinct. The abdominal muscles were drawn in, and he appeared to suffer pain. Subsequently, he improved a little, and was able to walk, though his motions were staggering and awkward. On the following morning I found him dead. The autopsy revealed nothing of moment, save vascularity in the lining membrane of the stomach and duodenum.

Expt. IX.—Three drachms of oil of ergot were given in the form of injection to a crow. The fluid was retained for four minutes and a-half, when it was forcibly ejected, and vomiting occurred at the same moment. He soon lost the power of voluntary motion and fell on his side,—his eyes closed, and he gasped laboriously. Slight muscular agitation then came on, chiefly confined to the legs. In seven minutes, the feathers became ruffled all over the body, and no indications of life were discoverable. In twelve minutes, he began slightly to revive, opened his eyes, and attempted to stand, but fell in each effort. At the end of half an hour, he was able to support himself upon his legs, but he preferred a crouching posture. During the next two hours he lay with his beak wide open; his eyes, which were half shut, were unaffected when either touched or scratched. He died at the expiration of seven hours. I could discover no morbid appearance except redness of the cloaca.

Expt. X.—Three sparrows, confined in a large cage, were compelled to swallow, each, ten drops of the oil of ergot daily, in three separate doses.

When given in this divided form, they did not appear to suffer immediately from its effects; but if the daily dose was administered at once, it occasioned symptoms of intoxication; the birds reeled about in a state of blindness and stupidity; subsequently, incomplete paralysis would prevail, and the power of voluntary movement would not return until the lapse of an hour or more.

One of the birds refused his food on the fifth day; his feathers were ruffled; he crouched in a corner; shunned his companions; and slept almost constantly. On the seventh day, he died.

Another was similarly affected about the ninth day; it afterwards became quite blind and stupid, and died on the twelfth day.

The third maintained its appetite surprisingly; nevertheless, it lost much flesh, and was so weak that it could not stand for many seconds together. Signs of convulsion were sometimes prevalent; the feathers on the breast and tail came off, and one of the eye-lids sloughed away. At last total blindness resulted, and death took place on the fifteenth day. In not one instance was I able to discover any morbid appearances; but the bodies rapidly decomposed.

In trying similar experiments with rabbits, I have found them much less susceptible of impression from the oil of ergot, than dogs and cats. But this appears to be greatly dependent upon the kind of food they eat. I have given six drachms of the oil with impunity, to a rabbit that had been previously fed for some time with lettuce; whilst a similar dose has killed another of the same age and weight, which had been kept upon bran and cabbage.

During my investigations of the chemical properties of this oil, I was sometimes confined for several hours in a close room, where it was elevated in the form of vapour; and not unusually on such occasions, I felt a curious tingling sensation over my limbs, distressing lassitude, irritability, and giddiness. This train of symptoms led me to the consideration of their probable cause; which I suspected to be the respiration of oil of ergot in a vaporized form. To satisfy myself of it, I performed the two following experiments.

Expt. XI.—A bull-terrier puppy, 14 days old, was put under a bell-glass receiver, capable of holding about a gallon of water, and subsequently, there was introduced the vapour furnished by half an ounce of the ergot-oil. The dog breathed very heavily for a minute and a quarter, when it drew up its legs and appeared to be dying. It was then removed, but it was quite unable to crawl. In about half an hour general convulsions supervened, which occasionally alternated with local spasms, the hind legs being chiefly affected. The fore-legs were sometimes stretched backwards, and the jaw was simultaneously drawn down. When an hour had elapsed, emprosthotonos came on in fits; the rigidity produced was nearly equal to that which occurs from strychnine. The sensibility of the body was much diminished, as also its temperature, and the heart's action was very slow and feeble. When six hours had elapsed, he began to revive, and his sensibility was such, that he cried furiously when only stroked with the hand. At the end of ten hours he had completely recovered the use of his legs, but he never appeared lively again, and died in eight days. The autopsy revealed nothing meriting notice.

Expt. XII.—The form of experiment adopted in the previous instance was repeated in this one, upon a spaniel puppy, three weeks old. It had respired the vapour for scarcely half a minute, when its inspirations became very deep and labouring; the mouth frothed abundantly, and the abdominal muscles were powerfully contracted. When a minute and a quarter had elapsed, the animal was removed, but scarcely any signs of life remained; every limb was flaccid and powerless; reaction never came on, but coma gradually supervened, and death took place at the expiration of two hours and twenty-five minutes.

These experiments were witnessed by Mr Bowker, surgeon.

SECTION XV.—*Therapeutic employment of the Oil of Ergot.*

We have learnt from the experiments already detailed, that the oil of ergot possesses exactly the same physiological action as the crude drug. We have next to inquire whether there be the same resemblances in therapeutic action? From a considerable number of trials made by myself, and by several medical friends, I am fully prepared to answer in the affirmative.

I have employed it in nine different instances, where the exhibition of ergot was peculiarly indicated, and in all of them it answered most satisfactorily. In four of these cases, in which the contractions of the uterus were sluggish and imperfect, yet the *os uteri* sufficiently dilated, it produced very increased action in six minutes, and delivery speedily followed. In three similar cases, the same effect was produced within ten minutes succeeding the exhibition of the drug, and the termination was equally favourable. In another instance, where the pains had ceased without any evident cause, and the progress of labour was interrupted, it restored the contractions of the uterus in thirteen minutes, and within half an hour, an easy and a safe delivery was effected. In the ninth example, the pains were for the most part suspended, from sudden terror with which the patient was seized; the pulse had risen from 75 to 130 beats per minute, and an alarming irritability of the whole system was prevalent. The administration of the oil in this case reduced the pulse to 90 in less than ten minutes; the irritability in a great measure subsided, and during a state of calmness, the uterine contractions were vigorously and steadily renewed, and within an hour from the time at which the dose was given, parturition was fully completed.

Dr J. Y. Simpson, Professor of Midwifery in the University of Edinburgh, very kindly tried the oil of ergot, and his opinion of its efficacy is thus expressed, in a communication with which I was recently favoured by him. "I have repeatedly employed your preparation of the ergot, and have always preferred it of late, because it has appeared to me to act with more precision than the infusion of the powder, and its dose is more easily regulated. I have used it both in cases of lingering parturition, dependent on deficient uterine contraction, and also in instances of *post partum* hæmorrhage. In one case of the latter, where the uterus relaxed, again and again, after the repeated introduction of the hand into its cavity, I gave your preparation in a large dose, (60 drops and repeated,) and very shortly afterwards the uterus began to contract firmly, and the woman, who was much reduced by the flooding, complained of the severity of her after-pains."

M. Meisser of Paris, to whom I sent a quantity of the oil, observes respecting it;—"I am much pleased with your preparation of ergot. I think it superior both to the infusion and the tincture. It has all the advantages, without the inconveniences of the former. It is easily regulated, does not offend the stomach, and operates with quickness and certainty. Since receiving your kind communication on the subject, I have employed it constantly, and it has ever equalled my desires. I have also recommended its use to many obstetricians, and they have found it most serviceable."

Two other friends, Dr Gordon and Mr Wilkinson, surgeon, inform me, that, after repeated trials, they are "satisfied the oil is much superior to any other preparation of ergot." In their use of it, "it has never produced sickness, nor offended the stomach in any way; its effects have been rapidly and certainly developed; nor has any injury or inconvenience followed its repeated employment."

I have seen oil of ergot administered in two cases of retained placenta; in each it produced energetic contractions of the uterus, and was speedy in promoting the expulsion of its contents. I have also witnessed its good effects in an instance of violent flooding which succeeded delivery. Here it had the happy effect of calming the irritability of the system, rendering the pulse softer and steadier, and inducing a full and complete uterine contraction, upon the absence of which the previous loss of blood had chiefly depended.

Besides the cases already mentioned, I may state that I have twice administered oil of ergot in troublesome diarrhœa, and with very marked advantage. The dose was 10 drops every three hours, and both the patients were cured on the following day. It must be understood, however, that this remedy acts simply by subduing any inordinate irritability of the intestines, for it is not physiologically an astringent.

I have also repeatedly given it in cases of irritability and cramp of the stomach, and have never known it fail to relieve or remove the symptoms.

The dose of the oil is from 20 to 50 drops. It may be given in any convenient fluid vehicle, such as cold water, warm tea, or weak spirit and water. The two latter I have found to be the most serviceable; for the result of some comparative trials which I have made has been, that the action of the oil is best secured by administering it in a dissolved or tolerably diffused form.

As an officinal article, the oil of ergot possesses many advantages which are wanting to the crude drug. It is of easy preparation, and may be kept for any length of time. I have a specimen which has been prepared for four years, and on trying it the other day, I found its activity to be in no degree diminished. The rules to be observed in its preservation, are simply to keep it in a well-stoppered bottle, and in a cool, dark place. An elevated temperature will volatilize it if there be any opening for its escape, and if not, there is produced deep discoloration. The prolonged action of sun-light has a similar effect. In either case the strength of the oil is diminished.

It is more easily and readily given than an infusion of the grain; it has a much less disagreeable taste, and operates with greater rapidity. It has also the very desirable advantage of rarely producing sickness. The nauseating effects of the common infusion are frequently complained of; and, not seldom, have they been a means of its popular condemnation. But the oil is in a great measure free from this objection. I have never known it to produce sickness or vomiting, and similar has been the experience of my medical friends.

SECTION XVI.—*External application of the Oil of Ergot.*

When this oil is kept in contact with the sound skin for some hours, it causes a little redness, but neither pain nor inconvenience of any kind.

I applied it to the skin of a bird daily, for the space of a fortnight, the feathers came off, and the surface was excoriated. In repeating the experiment upon a dog, no effect was produced. When applied to a recently wounded part, it occasions a little smarting, and quickly arrests the flow of blood. If an ulcer be dressed with the oil of ergot, the discharge is increased, and rendered very fœtid. Dropped into the eye, it produces violent and continued pain, an abundant discharge of tears, and much subsequent inflammation.

I have found this oil a valuable external application in cases of local rheumatism. I have tried it in three instances, and in all of them it has proved curative. The affected part should be well rubbed with it for a quarter of an hour, night and morning, until relief be obtained. It is one of the best remedies with which I am acquainted for the cure of toothache. I have repeatedly known it subdue the pain when creosote has failed. But, perhaps its greatest value, as an external application, is in the arresting of hemorrhage. I have often wounded small arteries in dogs and rabbits, and subdued the bleeding completely with a drop of this oil. Hemorrhage from the jugular and femoral veins has been similarly arrested. The troublesome bleeding which sometimes follows the extraction of a tooth, and leech-bites, it is equally efficient in stopping.

In a severe case of epistaxis, I arrested the hemorrhage, by injecting up the nostrils equal parts of very dilute spirit and oil of ergot; and I have little doubt that in the severe cases of flooding which succeed delivery, the injection of this oil diffused through water into the uterus, would be productive of the happiest results.

Art. V.—*Cases of Deformity of the Feet cured by the operation of Stromeyer.* By Robert Thomson, Esq. Surgeon, Dundee. In a Letter to the Editor.

Sir,—Having had under my care, since the 1st of September 1838, fifteen cases of two different species of deformity of the feet, namely, *pes equinus* and *varus*, which I have treated successfully by division of the *Tendo Achillis*, and other tendons, although some of those cases were of the highest degree of deformity, I beg to offer you the history of a few of the most remarkable of them, with casts of the deformed state of each foot, and also of the changes produced by the cure. The results of these cases, if you should deem them worthy of insertion in the Edinburgh Medical and Surgical Journal, may serve to make more generally known the value, simplicity, and utility of the Stromeyerian method of curing deformity of the feet, which is accomplished in a few weeks, and, in the generality of cases, with little or no pain, and without preventing the patient from walking longer than a few days.

As this method of curing deformity, depending upon a shortened state of certain tendons, or contraction and structural shortening of muscles, has not yet been generally adopted by the profession,—and as there are many individuals who may be thus benefited,—your giving publicity to these cases may induce practitioners to give it that attention which it deserves, and encourage those unfortunate individuals, the subjects of such deformities, to apply for the aid, which, in the great majority of cases, it is certain of affording, at almost any age, and without the least risk of injuring health.

A tabular view of the cases is subjoined.

Case I.—*Pes Equinus of the right side, from paralysis of the anterior muscles, and spasmodic contraction of the gastrocnemii.*—Master ——, aged ten years. His mother states, that, about the time he was expected to walk, she observed that the right foot was defective, that the toes drooped, and that he had not the same power of raising them as he had of raising those of the other foot, and that he was much longer in walking than healthy children generally are. At three years of age it was observed, that, on attempting to walk, the heel was raised from the ground, and that there was an inclination of the tarsus to bend outwardly. At this time his father applied to a mechanist, who recommended the use of a steel apparatus, which he has worn ever since.

At present, when he stands with both feet brought together, the heel of the right foot is raised about four inches and a half from the ground, and he walks upon the ball of the foot. The leg is very much smaller, and about two lines shorter than the other. The temperature is considerably lower, and he complains very often of the limb being cold; and although the right leg be stinted in growth, the limb, measured to the ball of the foot on which he rests, is considerably longer than the other limb, measured to the sole of the foot, which throws the body off its equilibrium, producing an unsteady jolting motion in walking, both painful and fatiguing to the young patient.

On the 1st September 1838, I divided the *Tendo Achillis* in presence of two medical friends, by a small slightly curved bistoury, which had been introduced according to the directions given by Stromeyer. The division of the tendon was accompanied by a peculiar rasping sound, audible to those standing near to the patient. The boy shed a few tears after it was over, not from pain, he confessed, but rather, it seemed, from the surprise which the operation had given him, from its suddenness and speedy termination. The wound was dressed with a small stripe of adhesive plaster and bandage; and the limb placed on a pasteboard splint well padded with wadding.

3d day after the operation. Has had no unpleasant sensation; no pain; has slept well; the wound almost closed.

4th day. Feels quite well; wound completely cicatrized. The limb was placed to-day in a modified form of Stromeyer's foot-board, the foot-piece at an angle of 25°, without using any extension, merely placing the foot in the apparatus loosely strapped, resting upon the ball of the toes, with the heel elevated about two inches from the board. This space of two inches was filled up with a soft pledget of wadding. At night, I found the heel had sunk by its own weight nearly to the board. The foot-board was removed for the night, and the limb was again placed on the pasteboard splint.

6th day. Considerable extension by elevation of the foot-piece attempted to day; ordered him to give weight to the foot; put him to bed with the apparatus on; the straps left very loose.

8th day. To-day the foot-piece of the machine was raised to the horizontal position. He complained a little of pain when he gave weight to the foot immediately after being dressed.

12th day. The foot-board has been raised daily since last report; the foot-piece is elevated considerably above the horizontal position. To-day he stood with both heels touching the ground.

21st day. The foot-board has been raised every day since last report, and the foot is now sufficiently bent. With the assistance of two sticks, he walked about the room to-day with a pair of common slippers.

28th day. To-day he complains of being all sore, of headach, and thirst. The pulse is quick, and the tongue loaded. These symptoms were the beginning of a febrile attack, which lasted the ordinary time of continued fever. I was glad that the cure was so far advanced, before this unfortunate occurrence, as all curative measures were left off for about four weeks. This attack of fever had no connection with the previous treatment for the removal of the deformity of the foot, being an attack of the common continued fever prevalent in the town. One of his sisters was seized ten days after him with the same fever.

The steel apparatus used by this boy from childhood had little or no control over the distortion, which had gradually increased to the above date. It only served to support the foot, enabling him to walk better; and in childhood, when the foot was feeble, probably prevented it from being converted into a varus.

This boy complained very little of pain during the course of treatment; sometimes a little after the straps were newly tightened, over the tarsus and inner side of the foot, in the situation of the deltoid ligament and *massa carnea.* The œdema continued for some weeks until the parts acquired strength.

Case II.—*Pes Equinus of Right Foot from Paralysis of the Anterior Muscles, and Contraction of the Gastrocnemii.*—James S., aged 22 years, tailor, says nothing was observed to be deficient in his foot till he began to walk; that the foot was then very weak; that, after he had acquired strength enough to run about, it was observed that he walked upon the fore-part of the sole of the foot; that the heel was raised from the ground; and that the deformity had gradually increased. At present the distance from the top of the heel to the ground is five inches and a half. The right tibia is fully an inch shorter than the other; the muscular developement is very defective, not appearing above half the thickness of the other leg; and he has great difficulty in keeping it in heat, although he wears additional covering. His foot is of a large size. When he walks, he treads upon the toes and the joints formed by the metatarsal bones and the phalanges; the great toe stands apart from the others, which are squeezed firmly together, and a little under each other; the skin on the under part of the three outer toes is indurated almost to the consistence of horn, showing that the greater part of the pressure in walking is on the outer part of the foot. There are two small callous protuberances on the dorsum of the foot, one above each of the two lesser toes, produced by the pressure of his boot. A little higher up, on the outer side of the foot, are two large callosities, produced, he says, by the pressure of the foot against the work table. Upon the very centre of the instep there is a cicatrix, the mark of a sore, which the lacing of his boot always produced when he walked far, and which has been a source of great suffering to him. See Fig. 1.

From the great elevation of the heel and pointing of the toes, the limb is considerably longer than the other; and this when resting on the sound limb, he endeavours to shorten, by bending the knee forward and inward. The lengthened state of the limb raises the sound one proportionably higher from the ground, giving a remarkably jolting up and down motion in walking, which, together with a sort of paralytic fling forward which he gives the foot, renders his gait very unseemly and disagreeable.

On the 16th September 1838, I divided the *Tendo Achillis*, in presence of two medical friends. Considerable pressure was required to effect this division, the tendon being larger and more dense than in Case I. The sound produced by the division was distinctly heard by a number of his friends who were present.

18th. He has felt perfectly easy since the operation. With the exception of an occasional tremor of the limb, he otherwise feels as if nothing had been done to it. The wound is closed.

19th. The limb was placed in Stromeyer's foot-board, at an angle of 25 degrees, well padded both behind the leg and under the foot, the former with flannel, and the latter with wadding, the foot resting on the inclined foot-piece, with the heel considerably elevated. The apparatus was removed at bed-time.

There was a considerable degree of swelling with increase of temperature, for which a cooling lotion was ordered.

22d. I have elevated the foot-board to-day, the heel having sunk down to it. The appearance of the foot is already very much improved, the convexity of the tarsus having receded considerably.

2d week. 29th. To-day, the foot-piece of the apparatus was raised to the horizontal position; the heel is about an inch from it; he has complained very much of pain over the external malleolus, which has impeded materially the progress of extension; has had some restless nights in consequence. Was obliged to give opium to procure rest. Upon examining the place to which he refers as the seat of pain, something is felt like a tight tendon passing along the inner margin of the external malleolus, which I proposed dividing; but to this, he expressed his decided aversion.

6th October. 3d week. The foot now forms a right angle with the leg, and he can stand with his heel and the entire sole of the foot resting on the ground. The increase of heat in the foot is gone, but considerable œdema remains, distending the loose integuments over the instep left by the receding of the convex tarsus, the œdematous integuments protruding between the straps.

4th week. October 13. The progress during this last week in elevating the foot, so as to produce flexion, has been very slow, chiefly on account of the pain over the external malleolus, which prevents him from walking about and giving the foot so much weight as would be necessary to overcome the opposing muscular fibres and ligamentous tissues of the foot.

5th, 6th, and 7th weeks. For the last two days he has been sitting over the fire, and complaining of feeling chilly; he has headach and watering at the eyes, with some acceleration of pulse.

From October 23d till November 3d. This febrile attack confined him to bed for ten days, during which time the extending apparatus was not used; and after it was reapplied only a few days, he had unfortunately an attack of iritis, accompanied with an eruption on the skin, for which he was brought under the influence of mercury. These occurrences have very much interfered with the elevation of the foot beyond a right angle with the leg, so that a minor degree of flexion only has been obtained.

8th week. The *Tendo Achillis* has now acquired considerable density, and the patient is unwilling to resume the use of the apparatus; says he is well satisfied with the cure. He walks out daily with a pair of common thin shoes, with two sticks to steady him. When standing, no person would know which foot had been the deformed one; but when walking, either from habit, or rather the want of power in the anterior muscles, he retains a little of the paralytic fling mentioned in the description of his deformed condition. From the shortness of the limb and its defective muscular developement, he stoops a little to the weak side. This may be obviated by wearing a shoe thicker in the sole.

He has resumed his usual employment, which, being sedentary, prevents the limb from acquiring muscular power. Fig. 2 is a drawing from a cast taken ten weeks after the operation.

CASE III.—*Case of Congenital Pes Equinus of the Left Foot, cured by division of the Tendo Achillis.*—Mr W. L., aged 27 years. At birth the deficiency in this case must have been very slight; for it was not till some weeks after that a friend upon a visit observed that something was surely wrong with the foot. The mother, however, is inclined to date the commencement of it to an injury some months subsequent to that, after which it got more evidently defective. When the child began to walk, which was when 18 months old, the nature of the malady became apparent; for it was now observed that the heel was raised from the ground. As the boy grew in years, the deformity increased, and it was then evident that the leg of the deformed foot was much smaller than the other. Walking was more than ordinarily fatiguing to him, and he very often stumbled or fell to the ground on the defective side. No curative measures have been resorted to. A boot with the heel raised to suit the deficiency has been the only assistance he has had to enable him to walk with any degree of comfort.

The following is a description of the state of his foot previous to the operation.—The foot, when he is standing, forms a straight line with the tibia, the convex tarsus, and the lower extremity of the tibia projecting three-quarters of an inch beyond the point of the toes. The heel has acquired its greater elevation, being raised about six inches from the ground, and appears to be squeezed against the lower extremity of the tibia, behind which it projects to the extent of three-quarters of an inch. The foot does not admit of the smallest degree of flexion or further extension, and were it not from the lateral motion which it admits of, it would be difficult to say that it was not a case of ankylosis. In walking, the foot rests upon the phalangeal extremity of the metatarsal bones of the four lesser toes, the great toe being drawn up about half an inch from the ground; the little toe is squeezed under the second, and the second under the third; and the cuticle of these two is indurated to the consistence of horn. As in Case II, there is a cicatrix on the most projecting part of the tarsus, which was produced by the lacing of his boot. The foot is about two inches shorter than the other; and the tibia is nearly as much deficient in length, and there is a great degree of atrophy of the gastrocnemii, the leg appearing nearly of equal thickness throughout. The foot and leg are always cold, and he wears additional covering with the view of keeping them in heat. He says, that, when a boy, he could ride tolerably well on horseback; but since his foot acquired its maximum of deformity, he cannot ride at all.

I had much fear in undertaking the treatment of this case; indeed, several of my medical friends who saw the cast of the foot were of opinion that it was a case of ankylosis. (See Fig. 3.) From the shortening of the foot and leg, the limb does not appear to be so much longer than the other as in Case II.; hence his gait is more steady, having less of the jolting motion in his progression. He wears a very clumsy boot, the greater part of which is covered by his trowsers.

On the 11th December 1838, I divided the *Tendo Achillis* in the usual way. The tendon was very large and dense, and much closer to the tibia, than usual. The foot felt rigid and unyielding after the division of the tendon, not admitting of any more flexion, feeling as if it would have sooner broken than yielded.

15th. He has felt perfectly easy since operation; the wound is cicatrized. The foot was to-day placed in the extending apparatus; the foot-piece at an inclination of 35° under the horizontal plane, being as great an elevation as could be given, so that the foot might not at all rest upon it. The ball of the foot rested, or rather touched the foot-piece of the apparatus at its upper half, the heel not reaching it by four inches. The leg could not be brought into contact with the upright part of the machine, unless at the most prominent part of the calf, the ankle being two inches from it, the distance of the intermediate parts of the leg of course gradually diminishing from the ankle upward. On account of this position of the limb there was much difficulty in the application of the straps, so as to fix the foot, and make pressure on the ankle.

18th. The board was kept on all night for the first time. The patient did not sleep well; complains of pain in the sides of the foot between the malleoli and *os calcis*.

20th. The patient kept the board on all night, but felt much uneasiness; took two grains of opium, which I left him, in case of restlessness. The heel has descended to within two finger-breadths from the foot-board, and springs down when he gives weight to it. The leg applies much better to the machine, and the foot is very much altered in shape; the convexity of the tarsus has greatly disappeared. The last two days there has been much swelling, accompanied with increase of temperature, for which he has used spirit lotion.

24th. He was restless in bed last night, and complained of pain in the ball of the foot, and his mother took off the apparatus, after which he slept well. The machine was reapplied. Upon calling during the day, I found the heel touching the board, which for the first time I elevated a little.

28th. To-day he complains of pain in the ball of the great toe, which is almost intolerable; fomented the foot in warm water, which for a time removed the pain; put some additional plies of wadding under it.

30th. Yesterday, I procured an air-cushion, and placed it under the ball of the toes, which has given him great relief.

6th January. The foot is greatly improved in appearance. Since last report the board has been elevated a little every day; the heel still descending; complains of pain at the sides of the foot, in the situation of the *ligamentum deltoideum*, &c. The pain of the ball of the great toe is less severe; there is a red spot, the size of a sixpence upon it; the foot is still very tumid; but the heat, and a degree of redness which accompanied it, are diminished. Foot well fomented with warm water daily.

13th. Cure still advancing; the foot-piece of the apparatus nearly raised to the horizontal, the heel springing down when walking nearly to the board. I have omitted stating that, for the last two weeks, the apparatus has been removed every night at bed-time, as he could not sleep with it without opium, the stupifying effects of which caused him to lie in bed till past mid-day, making him feel dull and spiritless. The foot was laid at night upon a splint, made as nearly to the acquired shape of the foot as possible.

20th, The foot-piece of the apparatus is now elevated above the horizontal plane; the foot now forms an obtuse angle with the leg.

27th, Little progress made in raising the board since last report. When sitting with both feet placed together, the one under treatment raised by a board placed under it to make up for the shortness of the limb, the heel touches the board at a right angle with the leg; but when standing with both feet together, the heel is about three-quarters of an inch from the ground.

The patient expresses himself well satisfied, and thinks the foot will be better than if the heel were fully down, on account of the limb being so much shorter than the other, which he thinks would oblige him to stoop very much.

12th Feb. Up to this date he has continued the use of the apparatus, walking occasionally an hour or two with a pair of common slippers. He has also walked three times in the evenings, with the assistance of two sticks, to his place of business, the distance being about a mile.

Jan. 1840, Up to this date, a twelvemonth since the operation, he walks with great ease; his gait is more graceful and much less fatiguing to him; free from the profuse perspirations which his former laborious mode of walking used to produce; nor does he require the use of a stick. About six months after the operation, he walked about twenty miles in one day with comparative ease. The sole of the shoe of the left foot is made a little thicker than the other to make up for deficiency in the length of the limb. Both feet are exactly similar in shape, and no one could know from his appearance that he had ever been the subject of *a pes equinus*. Figure 4 is a drawing from a cast taken three months after the operation.

Case IV. *Noncongenital Varus of the left side, cured by the division of the Tendo Achillis, Tibialis Posticus, and Flexor Tendons in the sole of the foot.*—Robert Stirling, aged 18 years, a tall slender young man. His mother states that he was born perfectly sound; that he had a severe fever when he was ten months old, during which he was seized with nervous fits, which lasted about two weeks, at which time the fever also ceased. The child remained long weakly, and about two months after this, a visitor, as in Case III., observed to his mother that surely there was something wrong with the child's foot. When examined, it was found to hang pendulous with the toes inclining inward. No curative measures were employed to prevent the increasing deformity, so that when the child began to walk, which was when twenty months old, he rested on the outer side of the foot.

The following is a description of this young man's foot previous to the operation. The heel is drawn up to nearly the greatest possible extent by the contraction of the gastrocnemii. The foot is completely turned backward and inward, and he walks upon the very centre of the tarsus or dorsum of the foot. The great toe and inner side of the foot being placed anteriorly, the little toe and outer side of the foot posteriorly, while the sole of the foot is so completely turned upward that the *os calcis* and tibia placed almost at a right angle to the foot, seem entirely to rest upon it. Upon the dorsum of the foot there is a large callous protuberance formed by the pressure in walking; and over the metatarso-phalangeal articulations of the three lesser toes, which sustained the pressure in his awkward mode of progression, are indurated tuberosities, in which he had much annoyance from corns. At the posterior part of the leg, a little above the part on which he treads, is the convex tarsus with some projections formed by the astragalus and lower extremity of the tibia, which, in a case of *pes equinus*, would have been the convexity in front of the foot.

The flexor tendons in the sole of the foot are felt very tight, so as to prevent the foot from being straightened or from yielding to the straight position. Fig. 5 is a drawing from a cast taken of his foot prior to the operation.

This young man never in his life time had a shoe upon his deformed foot. A woollen stocking with a piece of leather stitched on the part upon which he walked, was the only covering he ever could make use of.

On the 16th December 1838, I divided the *Tendo Achillis*, having divided the *tibialis posticus*, and the flexor tendons in the sole of the foot on the 9th, a week previous, which had made a visible improvement on the foot, allowing of its being straightened considerably.

22d, Applied to-day with much difficulty Stromeyer's foot-board, as no part of the sole of the foot could be brought to rest upon the foot-piece of the machine. The outer edge of it only touched the board. At my evening visit, I was disappointed to find the foot turned round into its deformed position. To prevent the recurrence of this, I procured a side-piece about two inches in depth, to keep the foot on the board.

31st December. The foot is nearly turned round, and the astragalus and other projecting bones of the tarsus have greatly receded, and the greater part of the sole of the foot is resting on the board.

Jan. 7th. The foot is turned entirely upon the sole, and the board, without much opposition, has been raised to the horizontul plane, the heel sinking down very readily, and without pain. The deformed appearance of the foot is gone. The foot having become very œdematous, a stimulating lotion was ordered to be frequently applied, and aperients and tonics were also prescribed.

16th. The foot-board has been gradually raised since last report, so that the foot is now sufficiently flexed. The œdema greatly gone;—the immense accumulation of indurated skin, which formed a cushion upon which he used to tread, remaining on the instep, giving to the foot an unseemly appearance. He is now able to walk about the house with a pair of common shoes, and the assistance of two sticks.

30th. The foot goes on improving, having increased in strength, and he can walk with greater freedom. He continues to sleep with the machine on all night, and occasionally walks out with it during the day. A large ulcer on the right leg, which has troubled him for a long time, and for which he was lately some time in the Infirmary here, has healed up during the treatment for the deformed foot. Fig. 6 is a drawing from a cast taken of his foot ten weeks after the cure, which shows the change effected.

Case V.—*Noncongenital Varus of the right foot, from paralysis of the anterior muscles, and contraction of the gastrocnemii cured by division of the Tendo Achillis and flexor tendons in the sole of the foot.*—Mary Ritchie, from Ballendean, aged 12 years, was born perfectly sound, and continued a stout healthy child until nine months old, when she was seized with a fever, which lasted two weeks. Soon after this, the mother observed that the right limb was defective, and consulted a medical practitioner, who said it would soon get better. Being disappointed in this, she applied to another practitioner, who ordered friction and bandaging. The child being in bad health, she was taken to the country, and in three months was brought home quite recovered in health, but the limb continued weakly. The mother then applied to a bone-setter, who gave the child much pain by squeezing the foot severely. She did not walk till she was four years old, when she got boots and steel springs to the defective limb; and with the aid of these contrivances, she walked with the assistance of two crutches, one of which she continued to use till she came under my care. Fig. 7 is a drawing from a cast of the foot taken before the operation, which shows that she walked on the dorsum of the foot, with the toes inclining inward, the sole being turned upward.

Unlike the other cases of varus of the same degree of deformity, the large callosity on the dorsum which they have is wanting. This is easily accounted for by the pressure of the body on the foot being diminished by her using the crutch.

On the 24th July 1839, I divided the flexor tendons in the sole of the foot, and on the 28th the *Tendo Achillis*. The wound being cicatrized by the 31st, the limb was placed on

Stromeyer's foot-board, well padded with wadding. About four hours after, I was twice sent for, with the complaint that the girl was crying in distraction. When I called I found the foot-board off, and the limb placed on the pasteboard splint, she being unable to bear the pain in the ball of the little toe, upon which the foot altogether rested.

On the 1st August, the foot was again placed on the foot-board, well padded under the ball of the little toe. She complained much of pain, but kept the apparatus on till the evening. The foot has come considerably round, and more of the sole is applying to the board.

8th. The board has been worn with ease since last report, and she has slept with it during the night. The foot very much improved.

15th. The foot is completely turned round, and the heel was sunk down to the board, the board having been raised to the horizontal position from an inclination of about 15°.

29th. The foot-board is now sufficiently elevated, so as to give to the foot the necessary degree of flexion. She can now walk with great ease with a pair of thin shoes, and a stick in each hand.

This elevation of the foot during the last two weeks has been very gradually, and almost imperceptibly obtained. The cure is now completed; but a perseverance in the use of the apparatus for two or three weeks longer was deemed necessary, until the divided tendons should acquire sufficient density; and the relaxed ligaments, &c. firmness, so as to prevent a return of the foot to the deformed state, to which there is a tendency.

December 20th. So perfect is this cure, that when both feet are together, no person could distinguish which one had been under treatment. She returned to Ballendean, eight weeks after the time she came under my care, and in a letter from her father four months afterwards, he states that she can walk with great ease without the aid of a stick; and that the leg is nearly as thick as the other, having gained in flesh, and very much increased in strength. Figure 8 is a drawing from a cast taken eight weeks after the operation.

Case VI.—*Congenital Varus of the right foot, cured by division of the Tendo Achillis and Flexor Tendons in the sole of the foot.*—Alexander Stormonth, aged 15 years, a stout muscular young man, with very large limbs. His mother says, that when he was born, the right foot was as much twisted as it is at the present time, only it wanted the large protuberance on the back part of it, which has been produced by the pressure in walking. This callosity is exactly on the centre of the dorsum of the foot.

The sole of the foot in this case is turned upward, and the heel is turned inward, very much resembling Case IV, though the deformity is less in degree. Though this boy's leg and foot are much stouter than the limbs generally are in such cases, yet the deformed limb is considerably smaller than the other, measuring an inch and a half less in circumference over the calf. See Fig. 9.

On the 8th September 1839, I divided the flexor tendons in the sole, and by the 14th the shape of the foot was so much improved, that he could walk about the house on the ball of the foot, which he never could do before.

On the 15th, I divided the *Tendo Achillis* in the usual way, and placed the limb on a well-padded pasteboard splint.

19th. I mentioned in the description of the foot, that this boy's limbs were more than ordinarily muscular. From this circumstance, and from the high degree of deformity, I anticipated much difficulty in the application of the apparatus, and also in turning round the foot from its deformed position, to that of a somewhat perfect form; but I was gratified to find that the reverse was the case. The division of the flexor tendons in the sole, a week previous, to dividing the *Tendo Achillis*, a method which I prefer, produced a wonderful change upon the foot, without any extension having been used, but, purely by the action of the powerful antagonist muscles, the resistance to the straightening of the foot having been overcome by the division of the flexor tendons. By the sixth or seventh day, he could walk about the house upon the ball of the foot, the case being converted from a varus to an ill-shaped *pes equinus*, the heel being about four inches from the ground.

The foot was placed to-day in Stromeyer's extension apparatus, without any difficulty, at an inclination of about fifteen degrees.

26th. I have elevated the board to-day to the horizontal plane, and the heel is nearly touching it. The extension has been daily made since the 19th, without the least pain or uneasiness. The projecting astragalus, *os cuboides*, &c. have greatly receded, and, in consequence, the large protuberance on which he walked, formed by indurated skin with the subcutaneous tissues, are loose on the outer side of the instep. There is very little œdema.

10th. The cure has gone on uninterruptedly since last report, and the board is now elevated sufficiently to produce the necessary flexion. He is now able to place the sole completely to the ground at a right angle with the leg, and he can walk a little with the assistance of two sticks. He can remove and apply the apparatus himself. He walks great distances with much facility, wearing a pair of laced boots.

Case VII. *Congenital Varus of the left foot cured by division of the Flexor Tendons in the sole of the foot only.*—————Batchelor, aged 14 years, was born with varus of both feet. Their restoration was attempted in childhood by means of steel apparatus, and it would appear with partial success; as at birth both feet were equally deformed, and he can now walk with the sole of the right one turned to the ground, although the toes are turned inward and much spread out, and the foot does not admit of flexion. In walking, the outer edge of the left foot touches the ground, but the heel does not appear to be drawn up; consequently there is no shortening of the *Tendo Achillis*, but the flexor tendons in the sole are contracted. He is very low in stature for his years; his legs are remarkably short; the toes of both feet are turned inward, having the appearance of double varus of the slighter degree.

On the 21st October 1839, I divided the flexor tendons in the sole of the foot, and on the 24th placed the limb in Stromeyer's apparatus, the foot-piece of the machine at nearly a right angle, which, in the course of three weeks, was elevated sufficiently to produce the requisite extent of flexion of the foot, without the division of the *Tendo Achillis*. The foot is turned fair upon the sole, and the projecting bones of the tarsus are reduced. He continued the use of the apparatus two weeks longer, until the new bond of union of the divided tendons should become sufficiently dense so as to prevent a return of the contraction.

Explanation of the Plates.

Fig. 1 is a drawing of the *pes equinus* referred to in Case II.

Fig. 2 is a drawing from a cast of the same foot, taken ten weeks after the operation.

Fig. 3 is a drawing of the *pes equinus* of the left foot, referred to in Case III.

Fig. 4 is a drawing from a cast of the same foot, taken three months after the operation.

Fig. 5 is a drawing of a case of varus, and referred to in Case IV.

Fig. 6 is a drawing from a cast of the same foot, taken ten weeks after the operation.

Fig. 7 is a drawing of a case of varus of the right foot, referred to in Case V.

Fig. 8 is a drawing from a cast of the same foot, taken eight weeks after the operation.

Fig. 9 is a drawing from a case of varus of the right foot, referred to in Case VI.

Fig. 10 is a drawing from a cast of the same foot, taken two months after the operation.

The casts which accompanied the above cases have been presented to the Royal College of Surgeons, Edinburgh, and may be seen in their Museum.

No. of cases.	Age.	Sex.	Species of deformity.	Foot.	Congenital or Non-congenital.	Degree of deformity.	Tendons divided.	Time under treatment.	Results.
1. Master ——	10	M	Pes equinus.	Right.	Non-congenital.	The heel 4½ inches from the ground.	Tendo Achillis.	8 weeks.	Complete cure; full flexion obtained; limb increased in strength.
2. J. S.	22	M	Do.	Do.	Do.	The heel 5 inches from the ground.	Do.	2 months.	The heel brought to a right angle with the leg.
3. Mr ——	27	M	Do.	Left.	Congenital.	The heel about 6 inches from ground.	Do.	Do.	The heel brought down nearly to the ground, the foot forming an obtuse angle with the leg.
4. R. Stirling	18	M	Varus.	Do.	Non-congenital.	Highest degree, foot doubled over, & walks on dorsum.	Tibialis posticus; flexors on sole, tendo Achillis 4 punctures.	8 weeks.	The foot completely turned, and full flexion obtained; walks on the entire sole.
5. E. S.	12	F	Do.	Do.	Do.	Highest degree, walks on dorsum with two crutches.	Tendo Achillis, flexors on sole of foot.	6 weeks.	The foot turned round, but being paralytic and the other limb drawn up, so that the foot does not touch the ground, she retains the crutches.
6. —— Kerr	12	F	Pes equinus.	Do.	Do.	Slight elevation, heel about 1 inch from gr.	Tendo Achillis.	4 weeks.	Heel brought down to ground, but from paralysis a deficiency of power.
7. M. Ritchie	12	F	Varus.	Right.	Do.	Foot completely turned, walks on dorsum with one crutch.	Tendo Achillis, flexor tendons on sole of foot.	8 weeks.	Complete cure, rapid increase of strength, walks without crutch.
8. A. Stormonth.	15	M	Do.	Do.	Congenital.	High degree, walks on dorsum.	Tendo Achillis, flexors on sole of foot.	6 weeks.	Complete cure.
9. —— W.	8	F	Do.	Left.	Do.	Walks on the edge of the foot.	Do.	8 weeks.	Foot turned round, but from neglect has partially returned.
10. —— Elder	4	F	Do.	Do.	Non-congenital.	Walks on the outer edge of the foot.	Do.	4 weeks.	Complete restoration of foot, walks upon sole, strength of limb increasing.
11. Batchelor.	14	M	Do.	Do.	Congenital.	Do.	Flexors in sole of foot only.	5 weeks.	Complete cure.
12. M. Lindsay.	12	F	Do.	Do.	Non-congenital.	Do.	Tendo Achillis.	3 weeks.	Complete cure.
13. Chalmers.	14	M	Do.	Right.	Do.	Walks on outer edge of foot on a bar of iron	Do.	Under treatment.	Complete cure.
14. M. B.	17	F	Pes equinus.	Left.	Non-cong.	Heel 2 inches from gr.	Flex. in sole & T. Ach.	6 weeks.	Complete cure.
15. J. B. 19 months.		M	Vari duplex.	R.& L.	Congenital.	Highest degree.	Tendo Achillis.	Under treatment.	

Total, 15. Males, 8; Females, 7. Pes equinus, 5; Varus, 11. Right foot, 6; Left foot, 10. Congenital, 6; Non-congenital, 10.

ART. VI.—*Appendix to a former paper on Anomalous Affections of the Respiratory Organs* By JOHN GAIRDNER, M. D. F. R. C. S. Ed. (Read before the Med.-Chirurg. Society of Edinburgh. 14th April 1840.)

IN the end of the year 1833, I presented to this society a few cases of anomalous affections of the respiratory organs, which were afterwards published in the Medical and Surgical Journal of this place, (Vol. xliii. p. 257.) In that paper I pointed out, that there are various convulsive actions of the respiratory muscles, which, although in some respects dissimilar, have such a general resemblance in others, as to justify us in classifying them together, and in suspecting some common origin. One instance of this sort is the incessant hiccup with which all who have had much experience in the treatment of diseases are familiar. I produced a case of pertinacious sneezing, supplied to me by my friend Dr Beilby, and a case of convulsive sonorous expirations, resembling howling or screaming rather than coughing, of which a patient of my own was the subject. The details of these will be found in the 260th, 261st, and 262d pages of the volume referred to. These affections, whether of hiccuping, sneezing, or screaming, agree in the following points. 1. They are all of them convulsive actions of the respiratory muscles, consisting of a sudden sonorous expiration, repeated at short intervals; not of a rapid succession of such expirations, as in fits of common coughing. 2. They harass the patient, either without any interval, or with very short intervals, during his waking hours. 3. They are entirely suspended during sleep. 4. They generally continue for several days, sometimes for weeks, and are very liable to recur in those who have once had them.

Since the date of the above-mentioned communication, a relation of mine in coming from London by sea, had on board of the steamer with him a lady, who was subject to this sort of howling or screaming. It went on incessantly, and from the description my friend gave of it, I can have no doubt of the identity of the disease with the case just-mentioned. Though a rare disease, it is therefore probably to be met with occasionally; and any suggestions as to the method of treating it will therefore, I trust, appear of some interest to a society of medical practitioners. It is in this point of view that I beg to offer the following case.

The subject of it is a lady, who might perhaps be approaching her thirtieth year, at the time when this narrative commences. She is of a remarkably mobile temperament, much more so than the subject of the former case. She was seized, in September 1836, with pretty severe headach, which was speedily succeeded by sonorous expirations at short intervals, going on incessantly. Each of these was performed with a sudden convulsive effort of the respiratory muscles, and with a remarkable jerk of the *recti ab-*

dominis. Various anodyne and antispasmodic draughts, as well as enemas, were employed, composed of morphia, henbane, castor, saffron, and other like agents, alternated with purgatives. Scarcely any benefit was derived from any of these. The headach became accompanied by great intolerance of noises, so that very inconsiderable sounds startled her excessively, and roused the convulsive action. Some confusion of thought came on, and some acceleration of pulse, and I became apprehensive of the existence or approach of inflammation of the brain or of its meninges. I therefore cupped her twice on the head, as near as possible to the seat of her pain, drawing a large quantity of blood both times. She was greatly benefited by both bleedings, and the complaint subsided early in October, after having been present about a fortnight. I may remark, that though she had sonorous expirations during this attack, they were more like the exclamations one gives on being suddenly startled, than like the shrill scream or howl of the former case.

Early in November an alarming sound in the street revived the starting, which yielded, however, to an opiate followed by a purgative.

About three weeks after this, the old symptoms came on, not, indeed, so bad as at the first, but with such severity, that I thought it prudent again to cup her on the head to the extent of twelve ounces of blood. This was attended with great benefit. She recovered in a few days, and went through the epidemic influenza in the January following, and the measles in the succeeding month of April, without any return of the symptoms above described.

In the middle of February 1838, about the termination of the menstrual period, she had a severe headach, and, learning at this time some disagreeable particulars of the illness of an intimate friend, she suddenly gave an involuntary scream or howl accompanied at the same instant by a convulsive rotation of the head with a sort of jerk towards one shoulder. The whole of this action was repeated every two or three minutes during all the waking hours, and was suspended during sleep. The sound was much louder than that which accompanied the startings in 1836. There was neither fever nor confusion of thought, and the complaint yielded in a few days to the remedies employed, which were chiefly cathartic. On comparing this lady's case with that of the other lady, formerly read to this Society, there appears to me to be a very close resemblance. In both the sound was intensely shrill and startling. Of the two the shrillness and suddenness were perhaps more remarkable in the subject of the present narrative, but the intervals between the screams were longer than in the other case. In the course of the two years which have since elapsed, she has had some ten or twelve different attacks of it, each lasting at least two or three days, often a week or more. Sometimes the howl has gone on every minute or two during all her waking hours. Sometimes it has been suspended for several hours, and has begun again. The treatment has consisted chiefly in the alternation of cathartics with tonics. Removal to the country in the summer was at one time of great service as a prophylactic.

In the month of March 1840, she had a very obstinate attack, which baffled all the modes of treatment I had formerly resorted to, and appeared to call for some new and more efficient remedial method. Recollecting that the nerves of the respiratory muscles are all of them connected with the upper part of the spinal cord, I applied *a blister to the nape of the neck*, and was delighted to find that the disease yielded immediately. It recurred, however, after the lapse of some days, and became as bad as ever. I then urged the repetition of the blister, but could not persuade her to apply it, as she was not satisfied that her relief on the previous occasion had really proceeded from it. After in vain trying opiate and antispasmodic injections both into the rectum and the vagina, I at length prevailed on her to submit again to the application of *the blister to the nape of the neck*, close to the occiput. It had scarcely begun to act, when the howl, which had persecuted her for several days, was at once removed. This was on the 23d of March. The blister was kept open for several days by the application of the *Ungt. Sabinæ*, and on inquiring for her more recently, (10th April), I found her still continuing free from her complaint.

When I sat down to write out this account, I was not aware of any similar cases having ever been treated on the same principle; but I have since made a pretty extensive search into the records of our profession, and have been much gratified to find that the same or similar theoretical considerations had induced others to adopt the same treatment in cases presenting many points of analogy, and that it had been attended with the same success.

In the Annals of Medicine (Vol. vii. p. 351–358), Dr Scott of the Isle of Man has recorded a remarkable case of a young lady, whose disease he describes as "somewhat resembling hiccup; that is, the inspiration was imperfect and sonorous, but not so convulsive, though more frequent than what we observe in genuine singultus. It was perhaps more in sound like the panting which occurs after violent exercise, or like an aspirate pronunciation of the interjection, Ha!" This disease resembled that of my patient in some very important particulars,—in the general character of the sound emitted, so far as one can judge of it from a verbal description; in the absence of fever, and of all acute symptoms; in the absence of all indications of organic disease; in being very loud and incessant during the day; in being completely suspended during sleep; and in having resisted a great variety of remedial measures. It seems to have declined gradually about six months after its commencement. She had a second attack of it, however, about three years after the first, which, after also resisting many remedies, yielded at once to a *blister applied to the back of the neck*, so as to cover completely the cervical vertebræ. It is curious and interesting to remark, that various other blisters had been previously applied in this case—to the throat and to the breast, between the shoulders, to the insides of the thighs, and to the side—and that all of these failed to remove the complaint. Dr Scott says he was induced to apply the blister to the part where it ultimately proved effectual, "by reflecting that the diaphragm, the organ probably chiefly affected in the disease, was supplied principally by the phrenic nerve, which is formed by the junction of the third and fourth cervical nerves, and *from having had experience of the efficacy of blisters to the same parts, in cases of singultus in typhus*, which had baffled other means."

I have the pleasure to acknowledge the confirmation which this practice has received from the experience of Dr Shortt of this city, who has inserted in the 39th volume of the Edinburgh Medical and Surgical Journal, (page 305—313,) a valuable communication "on Hiccup, its causes and cure." Dr Shortt thus describes his practice, and the rationale of it. "Soemmering recommends blistering between the shoulders; but the most powerful means, so far as I have had any opportunity of judging, appears to be that of *blistering the surface of the neck over the origin and course of the phrenic nerves*, for which purpose the blister is applied nearly round the neck to secure its position, and to cover fully the different parts concerned." Dr Shortt relates four cases in which this practice was successfully applied. The first was a case of common cholera, in which hiccup occurred as a symptom. The second, which was soon after fatal, was a case of disease of the liver and kidney with fever; in the course of which the same phenomenon presented itself. In the third case the hiccup was the effect of a blow on the mastoid process. In all of these cases, dissimilar as they are from each other, and from those I have detailed above, the hiccup seems to have yielded to the remedy. The fourth case presents a much closer resemblance to the subject of my present paper, as the case was unconnected with organic disease or local injury; and, to use the words of the author, "resembled a combination of coughing and sneezing more than hiccup, as the violent effort, consisting of the irresistible and involuntary expulsion of air from the windpipe, was produced during expiration; but the loud sonorous sound of the former did not exist, and no irritation of the nasal nerves was at any time apparent; while during the attack, the lower jaw was invariably drawn upwards and forwards as in sneezing." The disease, of which the subject was a boy of 10 years of age, seems to have occurred by fits, which were most severe in the morning, and lasted sometimes three hours without intermission. They were entirely suspended in sleep, and liable to be excited by mental emotions. The convulsive efforts succeeded each other sometimes at the rate of 330 in twenty minutes, (or more than once in four seconds,) producing extreme exhaustion. The remedies unavailingly employed were the following: emetics; purgatives; local stimulants and astringents to the throat; an alterative course of mercury; opium and hemlock externally to the neck, chest, and spine; narcotics of very various sorts, and quinine, internally; also the warm bath and garlic poultices to the epigastrium. *The disease at once yielded five hours after the application of a blister* in the manner described by the author.

Dr Bright has two very interesting cases illustrative of this subject in the second volume of his "Reports of Medical Cases." The first of these (Case 211, p. 457), a young lady, had laboured for a fortnight under an incessant convulsive effort, "something between a hiccup and an attempt to vomit," loud enough to be heard at the house-door when she was up stairs. The remedies employed "tranquillized the whole in the course of the night." They were, *a blister to the nape of the neck;* cold to the forehead; frequent doses of sulphuric aether; and purgatives of cathartic extract, and the compound galbanum pill. I need not say that I attribute the prompt cure to the first of these.

The other case (Case 212, p. 457), a girl of 18, had been for ten months subject to an involuntary sighing, much increased during the preceding six weeks. "She was unceasingly uttering a sound, like 'heigh-ho! heigh-ho!' at regular intervals of three seconds, so that the sound was repeated twenty times in every minute, unless it was at times changed for the single word 'heigh!' which was then repeated thirty times in the same period. This sound was, however, to a certain degree and for a short time under her control, so that she could check it, with much apparent exertion, for a few moments, while she uttered a short sentence; but it was immediately resumed when she ceased to speak; and if she attempted to put two or three sentences together, they were interrupted by this spasmodic and almost involuntary sound." The remedies employed were, a cold wash to the shaved head; *a blister between the shoulders;* colocynth with calomel, aided by senna; and a camphor mixture with æther every six hours. The spasms gradually subsided towards four o'clock of the following morning.

On comparing these two cases with that which I published in the forty-third volume of the Edinburgh Medical and Surgical Journal (p. 260,) a great similarity will be apparent in the general character of the disease, though not in the speediness of the cures. I was not then aware of what I now deem the just principle of the treatment, and I certainly attribute Dr Bright's greater success to the superiority of the methods he pursued. I only regret that he employed simultaneously such a variety of remedies, as the really efficient ones are thus deprived of a part of the evidence in their favour. I trust this evidence will appear more clearly by grouping Dr Bright's cases, as I now do, with others of a similar description.

I have not been able to discover any other recorded cases which possess the precise characters enumerated at the beginning of this paper, though I doubt not that a more extensive search might detect many such; but there are many instances of convulsive coughing, unconnected with hooping-cough, or with organic disease, which are probably referrible to similar causes, and will in all probability yield to similar treatment. An excellent and well-detailed case of this sort will be found in the Edinburgh Medical and Surgical Journal (Vol. vi. p. 499), and many similar ones may be found in the writings of physicians. I shall content myself with giving one example of this sort of cough, because it possesses considerable interest in reference to the subject of this paper, on account of the remedies employed. It is to be found in the sixth volume of the Medical Commentaries, page 343, and is related by Dr Charles Leith, at Johnstone, near Montrose.

The subject was a girl of fourteen, affected with a most violent convulsive cough, occurring by fits, with intervals of from half-an-hour to three hours, or even longer. The duration of the fits was from five minutes to twenty minutes at a time. Unlike some of the former cases, it had all the character of a genuine cough, or rather of a hooping-cough; for it seems to have been as violent as the very worst pertussis, and was alternated with very loud sonorous inspiration. She had passed through the real hooping-cough some years before. Dr Leith does not say if it was suspended by the supervention of sleep, but it had been several days in existence, when he was consulted.

The white oxyd of zinc had at that time a high reputation, and she was directed to take one grain every six hours. She had but one slight return of her cough on her way home from consulting the doctor, who attributes her cure to the oxyd exclusively, though he had also ordered her to be bled, and to have *a blister applied to her neck*. He accounts for this opinion, by stating that the cough had ceased before either of these remedies had been applied. This reason is tolerably valid as to the bleeding, which was not performed till the following day; but it is by no means equally valid as to the blister, which was applied that same evening. The first dose of the oxyd was taken at four o'clock, and, as the cough had previously to that time been sometimes several hours suspended, it is strange that he should not have thought it possible that its permanent suspension might be the effect of the blister. To our modern apprehensions, a grain of white oxyd of zinc taken every six hours, seems a very inadequate cause of its final cessation. I am much disposed to think that the blister was the efficient remedy in this interesting case.

I am very sensible of the caution necessary in drawing general conclusions from so limited a number of facts. Yet it is impossible to avoid speculating, even if it were desirable to do so; and as I agree in an opinion ascribed to the celebrated Dr Cullen, that false theories are far less injurious in medical science than *false facts*, I shall conclude this paper with a few inferences, to which the preceding details seem to me to point.

1. As the various actions above described, whether of coughing, hiccuping, sneezing, screaming, or a combination of two or more of these, involve the simultaneous movement of a variety of muscles connected with the respiratory apparatus, and as these muscles are supplied with nervous influence chiefly by the phrenic and pneumogastric nerves, which originate from what has been termed the respiratory tractus, so particularly described by Sir Charles Bell, it seems highly probable that the power of the blisters over these affections depends on some influence exerted by them on the state of the upper part of the spinal cord; and this inference is corroborated by the fact, that in one of the cases above related, blisters applied in other situations were totally inefficient.

2. It does not seem to me to be established by the facts, or rendered probable by any theoretical considerations, that the application of the blisters round the greater part of the neck, so as to follow the course of the phrenic nerves, as recommended by Dr Shortt, is essential to success. It is evidently a severe procedure. It is equally obvious that it is not always necessary; and it seems probable that the cure is in no degree owing to the application of the blisters over the course of the nerves; and that their benefits will be fully obtained if they are applied on that part of the spinal cord from which these nerves originate.

3. It seems to me probable, (though upon this subject I would be understood to speak with great diffidence), that the pathological and therapeutic principles above indicated may, if well founded, be of more extensive applicability, than to the forms of disease which I have been endeavouring to describe; and that all spasmodic affections of the respiratory muscles, which are not excited by inflammation, or by organic changes in some part of the respiratory apparatus, nor by mechanical irritation of the windpipe, or of its subdivisions, may admit of alleviation by similar treatment. I would therefore suggest the propriety of trying the effect of the application of blisters to the upper part of the cervico-spinal region in two diseases of this description;—I mean hooping-cough

and *laryngismus stridulus*, or the crowing disease of infants. Both of these produce violent spasmodic action of the respiratory muscles; and both are occasionally attended with great danger to life. Both, therefore, are cases which would warrant the application of a much more severe remedy, provided that it held out even a speculative prospect of alleviation or of cure. The researches of Watt and of others have sufficiently established that pertussis is often accompanied by inflammatory affections of the trachea and bronchi; but they have not established that those affections are the true causes of the violent cough, the very character of which leads us to attribute it to some irregular action of the nervous system. The very ingenious and beautiful theory of laryngismus, proposed by my much esteemed friend, the late Dr Hugh Ley of London, may be the true explanation of some cases of that disease; but I have had a dissection since the promulgation of Dr Ley's theory, which proves to me that it is not applicable to all cases of that description. The enlarged bronchial glands of Dr Ley, pressing on the recurrents, are sometimes not to be found by the most careful dissection; and there seems, therefore, to be a necessity, in such cases at least, for referring the complaint to some cause influencing the respiratory nerves at their origin. This view of the pathology of this singular morbid affection is by no means peculiar to me, but has presented itself to several of those who have written upon it. In an excellent treatise published in 1830, by Dr Marsh of Dublin, (Dublin Hospital Reports, Vol. v. page 616), in which he treats of this disease under the title of "Spasm of the Glottis," the author, after establishing by dissection the absence of all cerebral changes adequate to explain its symptoms, says, "It would be interesting on any future occasion to examine accurately the state of the pneumogastric nerve. The seat of the disease may perhaps be found to exist at the origin of this nerve; and topical applications made as nearly as possible to its origin, may be found to constitute an important part of the treatment." In this opinion, or rather hypothesis, I exactly coincide; and I merely observe in addition, that of all "topical applications" it appears to me, on the strength of the analogies I have endeavoured to establish, that blisters afford the best chance of success, and are best deserving of a fair and impartial trial.

Dr Bright, in the remarks with which he concludes his very interesting cases of hydrophobia (Reports, &c. Vol. ii. pages 605—607,) proposes as remedies for that formidable disease, "cupping, leeches, moxa, and blisters about the nape of the neck, and the upper part of the spine;" and he has evidently been impelled to this proposal, by the consideration that the symptoms of hydrophobia "seem to be immediately dependent upon some morbid action excited in the nerves of organic life, or that particular set of nerves which has been so beautifully illustrated by Mr Charles Bell as connected with the respiratory apparatus."

I might pursue these analogies to the theory and treatment of some forms of spasmodic asthma; but I shall not at present press these hypothetical conjectures any further. I trust I may have succeeded in making out a case of sufficient strength to induce my professional friends to make a trial of the practice; and, as some of the forms of disease to which it is applicable are by no means of frequent occurrence, I hope they will be induced to favour the society and the profession with the results of their experience.

I have only to add, that I shall be greatly obliged by being made the channel of such communications, from those who may peruse what I have written on this interesting subject.

18, *Hill Street*, *Edinburgh*.

ART. VII.—*Remarks on Tic-Douloureux*. By EBENEZER SKAE, M.D.

PERHAPS no class of diseases presents so many difficulties both in the prosecution of pathological inquiry, and in the employment of remedial agents, as that which includes affections of the nervous system; and of these, none more than the one on which we propose to offer the following remarks. So much, indeed, has been already contributed by eminent writers with the view of elucidating the nature and appropriate treatment of *neuralgia*, without yielding a proportionate degree of information on the complaint, that we are prepared to regard with no small distrust, if not with a positive expectation of disappointment, any renewed attempt to add to our knowledge of this intricate subject. Unquestionably, from the very nature of the functions carried on by the nervous system, there arises a source of embarrassment entirely peculiar to this department of pathological study; and hence, assuredly, the remarkable fact, that the degree of information possessed on nervous affections is by no means commensurate with the amount of research bestowed upon them.

Of late years, however, much has been done to give a more rational direction to the investigation of functional and organic affections of the nervous system, by rectifying and extending our knowledge of its structure and functions. So long, indeed, as these continued to be a matter of comparative conjecture, no sound views could be entertained either of the nature or of the treatment of nervous diseases. Of the recent accessions to our knowledge of this department of anatomical and physiological science, none are more valuable than those for which we are indebted to the researches of our distinguished countryman Sir Charles Bell; and in reference to the subject of our present remarks, he has undoubtedly brought forward many facts which tend to throw considerable light on the pathology of tic and other neuralgic affections.

Although the notice of this class of complaints was long limited to those affecting but a few regions of the body, there can be no doubt as to the possibility of the disease showing itself in any situation pervaded by sentient nerves. Dr M. Good has mentioned three species; *neuralgia faciei*, *pedis*, and *mammæ*. Mr Abernethy has recorded a case in which the disease was situated in the ring-finger, and Sir Charles Bell has related several instances in which it appeared in various situations; but without doubt by far the most frequent seat of neuralgia is in the sensitive branches of the trifacial nerve, where it is generally distinguished by the name of tic-douloureux.

The first writer who gave an accurate account of the complaint seems to have been André, who published his remarks in 1756. About twenty years afterwards an operation, performed by Louis for its relief, occasioned the discussion before the Faculty of Medicine of Paris, "Utrum in pertinacibus capitis et faciei doloribus aliquid prodesse possit sectio ramorum nervi quinti paris." Among the early descriptions of the disease, however, perhaps the best is that published by Dr Fothergill;* since that time the disease has formed a subject of study and observation to numerous writers, by whom various theories have been brought forward for the purpose of elucidating its nature and means of cure, many of them ingenious enough, but still, after all, leaving the pathology of the complaint nearly as much a matter of conjecture as it had been previously.

Before entering on a consideration on the nature of tic in connection with the details of a case which came under my own observation, the history of which seemed sufficiently instructive to induce me to bring it forward in connection with these remarks, it may not be improper to glance for a moment at the general features of the complaint.

The division of this complaint by the French into four species seems open to a very serious objection, that of including in the number, neuralgia of the facial nerve, the functions of which is such as manifestly to exclude it from becoming the seat of tic; a fact abundantly illustrated by Sir Charles Bell, in his observations on the offices of this nerve; and clearly deducible from the disastrous effects produced by its division.† Unquestionably the three facial branches of the trigemini, which bestow sensibility on the face, and the other parts to which they are distributed, constitute the only seat of tic. The disease usually developes itself in a more or less circumscribed form in the first instance, in one of these branches where they emerge on the face; but through its communicating filaments, it may ultimately involve the whole of the affected side of the face and head. When the frontal region is the primary seat of the complaint, the pain, which may be described as of a darting, lancinating, or plunging character, commences in the external branch of the ophthalmic nerve, where it passes through the superciliary foramen; it shoots along its ramifications on the frontal and temporal regions of the cranium, and downwards into the orbit itself. When the attack of pain ensues, the patient feels as if suddenly struck with lightning; he firmly presses his fingers on the part, if possible, to mitigate the violence of his suffering; the eyelids are involuntarily twitched; and, perhaps, a flow of tears takes place. Should the disease continue to increase, the pain will be propagated along the communicating filaments of this nerve to those of the other trunks, and the patient latterly suffers under paroxysms of pain, shooting along the whole of the affected side of the face and head.

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* Fifth Volume of Medical Observations and Inquiries.

† Appendix of Cases, p. 250.

Perhaps the most common seat of tic is in the infra-orbital branch of the superior maxillary nerve, where it emerges from the infra-orbital foramen. When in this situation, it generally involves the lower eyelid, the cheek, the ala of the nose, and the upper lip; and frequently those branches of the nerve which are distributed to the zygomatic fossa, the alveoli, and the palate; and, like the preceding, it may extend over the whole affected side of the face and head.

Maxillary neuralgia, as it has been termed, or neuralgia of the inferior maxilla, is of more rare occurrence in a primary form than the two preceding. Like these, however, it may ultimately spread, by means of its communicating filaments, over the whole of the affected side of the face and head.

The diagnostic symptoms of tic are in most cases sufficiently characteristic, to prevent its being mistaken for any other complaint. In numerous instances, however, the symptoms have been confounded with those of toothache; and many sound teeth have been extracted in consequence, frequently, of both the patient and medical attendant being misled by the circumstance of the pain being seated in these organs. This error is most likely to occur in the infra-orbital and maxillary forms of the complaint. From the pain, however, darting along the course of the affected nerve; from its being more superficial; from its being generally accompanied with spasmodic twitches; from the paroxysms being of shorter duration; and, in most cases of tic, alternating with intervals of perfect ease, it may very readily be distinguished from odontalgia. The same features, too, of the disease, sufficiently obviate the probability of its being mistaken for those rheumatic affections, and other painful complaints, which are situated in the same regions.

Tic-douloureux is, as its name implies, a disease characterized by the most intense suffering. In most cases, however, it is not accompanied with any considerable degree of constitutional disturbance, and on this account it is not generally regarded as a dangerous complaint. But although, under ordinary circumstances, it may afford room for a favourable prognosis, still its occurrence in a constitution enfeebled by years or disease, and ill calculated to withstand the exhausting influence of continued want of sleep and excruciating pain, may so break down the powers of the system as to pave the way for hectic dissolution. Such, indeed, was the fatal result of the case to which we have already alluded as having come under our observation.

In shortly adverting to the nature of tic, for the elucidation of which many contributions have been submitted to the profession, perhaps the remark is justifiable in reference to the views of a large proportion of writers on the subject, that in the formation of their opinions, they have been too much guided by the effects of remedial agents. On this imperfect species of inductive reasoning, one of the most prevalent notions of the pathological character of the complaint is, that the disease consists in a symptomatic disorder of the affected nerves, essentially depending on debility of the digestive organs. This assumption has been founded on the fact of tonic remedies having frequently proved highly beneficial in the treatment of tic. But it may be observed, that due attention to the functions of the chylopoietic viscera is not only indispensably necessary in almost all forms of disease, but in many, it is by itself productive of considerable relief and abatement of the symptoms; and the reason of its being so is by no means mysterious. Hence the mere circumstance of such treatment proving beneficial in tic, affords no just ground for concluding, that the cause of the disease developes itself in the first instance in the digestive organs; for the same system of reasoning would necessarily lead us to adopt similar views of the nature of other diseases, which like tic may admit of considerable amelioration by improving the condition of the *primæ viæ*, but which we assuredly believe to depend on the operation of morbid causes elsewhere developed, and more or less independent of the state of the digestive apparatus. On these grounds, then, we think we are warranted in affirming that the evidence of tic being virtually an affection of the chylopoietic viscera is extremely imperfect. But the suggestion of Sir Charles Bell, in reference to this view of the disease, in which he adduces the fact of a direct connection between the sympathetic system of nerves and the fifth cerebral pair, if it does not entirely prove the soundness of this opinion of the disease, goes far to demonstrate the probability of *facial neuralgia* being symptomatic of remote visceral irritation.

Other writers on the subject have directed their chief attention to the immediate site of the suffering, and ascribe the painful symptoms to increased vascularity of the neurilema, or vascular membranous envelope of the affected nerves. Sir Astley Cooper, however, contradicts this idea, on the ground that he has found the nerves of their natural colour, and rather diminished than enlarged. Others, on the opposite hand, state that the nerves are occasionally found in a thickened condition. Not to dwell, however, on the different opinions advanced on this subject, it may be well first, to give an outline of the case already alluded to, as having come under my observation, and then to consider how far the features of its history tend to elucidate the pathology of tic.

J. E., aged 60, a gentleman of slender make, and in whose constitution the nervous bilious temperament seemed to predominate, was first affected in the spring 1833, with symptoms of facial neuralgia, situated in the external branch of the ophthalmic nerve of the left orbit, and speedily involving the whole temporal and frontal region of the affected side. He then consulted my esteemed friend, Dr Forbes of Kennoway, whose reputation in Fife is well merited by his talents and long experience, who regarded it as a decided case of tic, and treated it accordingly. Under his care some abatement of the symptoms took place, but in a very slight degree. A change of air was afterwards recommended, and in the course of the following summer the patient had the valuable advice of Dr Abercrombie, who recommended the employment of a combination of carbonate of iron and the powder of valerian, with the application, at intervals, of small blisters to the temporal region of the side effected. Notwithstanding this treatment, however, the symptoms continued with little or no abatement, and towards the end of summer, the paroxysms of pain became more severe, and ultimately "darted," as the sufferer expressed himself, along the whole of the affected side of the face and head. He came under my care during the autumn of the same year, and I continued in attendance along with Dr Forbes till the month of February 1834, when the disease terminated fatally.

It may be remarked, that, in the earlier stages of the complaint, it had all the usual symptoms of tic. The pain was of the most excruciating kind, darting along the course of the supra-orbital and infra-orbital nerves, the inferior maxilla being but little affected till a late period of the disease. The paroxysms were most severe during the night; and, as in all cases of neuralgia, they were distinctly characterized by intervals of freedom from pain. Towards the termination of the disease, however, along with the usual symptoms of tic, there supervened a dry state of the affected nostril, and complete insensibility to the stimulus of the most powerful sternutatories, as well as some degree of deadness over the cheek, and a sensation in the left side of the mouth and tongue, as that which might be experienced from the presence of sand. On the occurrence of these symptoms, I of course felt satisfied of the presence of organic disease in the course of the affected trunks, and the treatment was modified accordingly. The remedial measures which seemed to yield the greatest benefit, were stated attention to the digestive organs by the exhibition of alterative aperients and light tonics; occasional small bleedings from the temporal region, followed by the application of blisters; and keeping up for a series of weeks a moderate discharge from the nape of the neck by means of an issue. Opium, conium, and belladonna, yielded but slight and passive benefit; and the first seemed to act most advantageously in the form of *Pulv. Ipecach. C.* The system was also brought under the specific influence of mercury, but with little benefit; the only remarkable circumstance attending its exhibition being the smallness of the quantity required to affect the mouth.

On opening the head thirty-six hours after death, along with Dr Forbes, we found the upper surface of the brain presenting its usual appearance, with the exception of slight venous turgescence. The cerebral mass was then removed from its situation by the careful division of its connections to the base of the cranium, and its lower surface also presented no marked deviation from health. The most obvious structural change, however, presented itself in the left side of the base of the cranial cavity, and occupying that portion of it, which is formed by the ala of the sphenoid bone, and comprising that space posterior to the sphenoidal fold of the *dura mater*, through which are transmitted the maxillary branches of the fifth pair, and partially involving the *foramen lacerum orbitale.* In this situation, the affected side seemed considerably elevated, so much so, indeed, as to destroy the symmetrical appearance of the middle region of the base of the cranium. On accurate examination, this was found to depend on very considerable thickening of the *dura mater* around the exits of these nerves and the *foramen lacerum orbitale.* There was also a slight effusion of serum in this region. The substance of the bone subjacent to the seat of the disease, and to which the morbid structure was firmly adherent, seemed itself entirely healthy. The three nervous trunks, as well as the Gasserian ganglion, were carefully examined; but none of them presented any perceptible change from their normal state.

The history of this case, viewed in connection with its necroscopic character, seems to me to prove two important points: *first*, that the symptoms of tic-douloureux may depend on the operation of a local cause; and, *second*, that this local cause may be compression of the nervous trunks. With respect to the first of these, viz. that neuralgia of the face may be produced by a local cause, I would observe, that although the case in question exhibited in its latter stages those symptoms which Sir C. Bell has particularly specified as indicating organic disease in the course of the affected nerves, yet, in its first stages, including a period of several months, it was distinguished by those features which are generally considered as diagnostic of genuine tic, and accordingly it was viewed and treated as such by the most experienced practitioners.

A case of considerable interest, and bearing on this view of the disease, is given in the London Medical and Physical Journal.* A young woman, when a girl, had her cheek lacerated by falling on a teacup, a fragment of which was imbedded under the skin, and the wound was healed without its being extracted. Soon afterwards she was seized with violent nocturnal paroxysms of neuralgia, accompanied with paralysis of one side of the face. At the end of fourteen years, an incision was made through the cicatrix, when a piece of the teacup was extracted. From this time the neuralgia and paralysis ceased.

In further proof of tic being the result of local irritation, it may be remarked, that neuralgia is by no means unfrequently developed in other regions of the body besides its more common seat in the face; and in many cases of this description the exciting causes have been local. Such, indeed, was the character of the case mentioned by Mr Abernethy, in which the disease was situated in the ring-finger, and which was permanently cured by the excision of a portion of the affected nerve. Similar instances are also recorded by Mr Lawrence, Sir A Cooper, and others, all of which furnish direct proof of neuralgia being produced by the operation of an exciting cause seated in the affected parts.

The failure in removing neuralgia of the trigemini by means of dividing or excising a portion of the affected nerve, where it emerges on the face, cannot with propriety be urged as an objection to this view of the complaint; for it is evident that the success of such a measure must depend entirely on the seat of the irritation being lower than the point of division, or, more properly, external to it. But assuredly, the want of success attending this mode of treatment seems completely subversive of the hypothesis assumed by some writers on the subject, that the disease consists in "a morbid increase of the sensibility of the extreme twigs of the nerve," and that "the only modes of treatment deserving notice" are the cautery and the knife. Undoubtedly these remedies have the merit of being in strict accordance with this notion of the complaint; but their failure in the greater proportion of cases, in which they have been employed, furnishes the strongest proof that could be wished, that such a definition of the complaint is entirely gratuitous. It would be idle certainly to deny that the sensibility of the extreme twigs of the nerve is morbidly increased; but this we know to result from irritation applied to any part of the trunk of a sensitive nerve; and its occurrence is well understood as a source of fallacy in estimating the character and comparative importance of symptoms in many painful diseases.

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* March 1823, p. 199.

In adverting to the second inference, viz. that the local cause productive of tic may be compression of the nervous trunks, I would observe, that the history and necroscopic character of the case in question seems clearly to justify the conclusion, that the symptoms from the commencement depended on this cause. As there was no apparent trace of any organic change in the nervous trunks themselves, it seems evident that the pressure of the contiguous structures occasioned the severe train of sufferings which ultimately destroyed life. But in assuming that the exciting cause of facial neuralgia may in some cases be local, and that such an exciting cause may be compression of the nervous trunk, I would not be understood as insinuating, that, in all cases of this description, there must be more or less thickening of the *dura mater* around the cranial exit of the affected nerves, but merely that, as in this case, the symptoms of tic were produced by compression of the trigemini, so in like manner pressure from any other cause might give rise to the same symptoms. On this principle it does not seem unreasonable to suppose, that facial neuralgia may be produced by disturbance of the circulating fluids in the vessels adjacent to the nervous trunks, especially by an increased volume of blood in a situation where the rigidity of the neighbouring structures prevents a ready diffusion of the pressure: or the same effects will be obviously produced by determination of blood to the vascular membranous envelope of the nerves themselves, particularly where they pass through osseous canals. That these local causes may sometimes contribute to the production of tic, seems the more probable, from the fact of dyspeptic affections being a common source of determination of blood to the brain and its appendages; and in most cases of the complaint, a disturbance in the functions of the chylopoietic viscera is a prominent accompanying symptom.

In contending, however, for the operation of a local cause in some cases of facial neuralgia, it is far from my intention to deny that the disease may frequently be symptomatic of visceral irritation. But in admitting that the symptoms of tic are produced by this remote irritation, it seems most consonant with sound pathological reasoning to infer this view of the complaint, not from the successful exhibition of any particular remedies, but from the existence of a chain of nervous communication between the trigemini and the digestive apparatus by means of the sympathetic nerves. "The moment that we see the map of the relations of the sympathetic nerve, with the second division of the fifth, by a large and direct branch, and lesser connections of the same nerve with all the branches of the fifth, we surely need look no farther in explanation of the frequent and intimate dependence of a painful affection of the face upon the state of the digestive organs."* Whether the visceral irritation which gives rise to tic-douloureux be of a peculiar character, or whether it be developed in any particular part of the alimentary canal, does not yet seem to have been ascertained; although Sir Charles Bell infers that, from the length of the tube, and from the circumstance of distinct portions of it being particularly affected by different medicines, these, when in a disturbed condition, may influence remote parts, and with various effects. Such, indeed, he states as having been his conviction when he prescribed as a remedy the internal exhibition of croton oil.

From our comparative ignorance of the *modus operandi* of the principle of nervous action, it is impossible, in the present state of our knowledge, to form any thing like a definite conception of that morbid condition of the trifacial nerves resulting from remote irritation, which gives rise to the painful symptoms of tic. Whether the distant morbid impression made upon the ganglionic system is simply transmitted to, and sustained by the fifth, agreeably to some law regulating their sympathetic influences, or whether the nervous communication may serve as a channel for conveying to the trifacial branches such a morbid stimulus as will excite a determination of blood to them, must for the present be a matter of pure conjecture. Judging from analogy, however, we might reasonably infer the latter of these phenomena to be by no means an improbable occurrence, seeing that determinations of blood, eruptions, and other morbid conditions of the face, frequently form very striking indications of distant and internal disease.

If the pathological character of tic be such as we have endeavoured to illustrate by the preceding imperfect remarks, it follows that there are two forms of the disease;—one in which the symptoms are the result of local irritation, and another in which the complaint is symptomatic of visceral irritation, conveyed by the sympathetic nerve.

In briefly applying these views to the treatment of facial neuralgia, it is evident that the circumstance of its arising from distinct causes must render the exhibition of remedies, which are beneficial in some cases, in a great measure useless in others. The operation of dividing the affected nerve can seldom be of any benefit, unless the point of division be above the seat of the complaint. This of course can only be effected when the complaint is local; and it is highly probable, that in most cases of this description, the source of irritation is beyond the reach of the knife.

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* Sir Charles Bell on the Nerves, p. 356 of Clinical Remarks.

When there is reason to suspect irritation in the course of the affected nerve, along with strict attention to constitutional treatment, especially as regards the employment of purgative and alterative medicines, benefit will be derived from local bleeding by means of leeches applied either to the temple, the gums, or the inside of the nostrils, as circumstances may indicate; or should the constitution and age of the patient, as well as the violence of the symptoms, justify its propriety, this may be more effectually accomplished by opening the temporal artery. Afterwards, the employment of counter-irritation by means of blisters, &c. may be profitably adopted, accompanied by the use of anodynes, both internally and externally.

If the symptoms depend on visceral irritation, the internal exhibition of croton oil, as employed by Sir Charles Bell, ought to have a decided preference. As an instance of its success, I subjoin the notes of a case with which I have been favoured by my friend Mr Lumgair of Largo.

"In compliance with your request, I take the earliest opportunity of giving you a brief outline of my case of tic, with the treatment pursued. The subject of it is a female, Mrs P. aged 60. She states, that, for the last five years, she has occasionally felt uneasy sensations in right side of forehead, and right cheek, which seldom gave her much inconvenience. I was requested to visit her about the beginning of December 1839. She then complained of excruciating pain a little below right orbit, extending over the cheek and side of the nose, and also at the root of the *dens cuspidatus* of same side, which seemed slightly carious. From the history of the case, the seat, and the character of the pain, which she compared to an electric shock, or the passing of a sharp instrument through the head, I was of opinion that it was a neuralgic affection of the nerves of the face, and accordingly administered one drachm of the carbonate of iron thrice a-day, which had the effect of relieving the pain of the face, but the uneasiness in the tooth still continued, and at her request I extracted it. Not many minutes after, the pain returned with greater violence than before, so much so that I was called to her during the night, when the paroxysms were so severe as to make her start suddenly, and even to spring out of bed. Her sufferings abated but little under opiates, local bleeding, and warm anodyne applications. On the first day of January last, she was affected with such a violent paroxysm, as to induce me to bleed her to syncope, and to apply a blister to the occiput encircling the ear. These measures also proved futile. At the recommendation of Dr Forbes, two drops of croton oil were given twice a-day, and afterwards increased to six daily. This was persevered in till, in consequence of debility, vertigo, *tinnitus aurium*, palpitation, &c. it was partly discontinued, two drops being only given every alternate day to keep up the action of the bowels, and the carbonate of iron was substituted. From the time the croton oil was commenced, the paroxysms of pain became daily shorter and less severe, so that now they are comparatively trifling. Such, I believe, is, as far as I can recollect, a fair account of the case.

Whether you can make a clear case in favour of the beneficial influence of croton oil, or not, I cannot say; but certainly the patient was always getting worse until it was administered; and the amendment afterwards was steady and progressive. Perhaps the blood-letting, which was practised immediately before its use was commenced, might aid its operation. I feel convinced that the croton oil was of eminent service in this case; and, should a similar one again occur in my practice, I should give it a fair trial in preference to any other remedy. Having never seen Sir Charles Bell's observations on this complaint, I should feel obliged could you let me know how he accounts for its salutary effect. Could you, in short, describe to me its *modus operandi*."

In reference to the employment of tonic or stimulating remedies in tic, there can be little doubt of their having frequently proved of considerable service; but, perhaps, it will be more consistent with the pathological character of the complaint not to depend altogether on their specific effects, but to accompany their exhibition with the use of such other remedial agents, as the peculiar features of the case may seem to indicate.

Leven, Fife, 27th February 1840.

ART. VIII.—*On Nervous Headach from exhaustion, and its Treatment with Aconite.* By THOMAS H. BURGESS, M. D., Fellow of the Royal Medical and Chirurgical Society, &c. (Read before the Westminster Medical Society, Saturday, February 1st 1840.)

ALTHOUGH nervous headach is more a painful and distressing complaint than one truly dangerous, nevertheless, its frequent occurrence, the wide range of society it attacks, from which no class is exempt, (for the old and the young, the grave and the gay, and the student of literature, in every acceptation of the term, are alike subject to its torments,) render it well worthy of the attentive consideration of the medical practitioner.

No disease is more troublesome to the physician, none more frequently baffles all his efforts to subdue the pain, or give even temporary relief to the patient, from the excruciating agony of its paroxysms, than this form of cephalalgia; and yet, to the eyes of the unprofessional individual, especially when a stranger to the complaint, none appears more simple or more easy of cure, not even excepting toothache; and no other patient is, in popular estimation, less deserving of sympathy or commiseration, than the unhappy being who suffers from nervous headach.

I do not intend to give here a detailed account of the several varieties of headach. I have merely to make some remarks relative to an individual form of the complaint, and these I shall endeavour to state as briefly as possible.

I. There are two conditions of body which appear to me to be intimately associated with the form of nervous headach. The one is characterized by general anæmia, the other by the debility consequent upon nervous exhaustion.

1. The former takes place in individuals who lead a sedentary life, who are ill fed, and who live in a close, confined, and unhealthy atmosphere. But it is by no means confined to this class of society. In the middle and upper ranks, the same bloodless condition of the system is frequently induced by different but equally pernicious causes. The pernicious effects of fashion and refinement in one or other of their protean forms visit the proud and the affluent with the same affliction that penury and want bring to the door of the poor and indigent.

Nothing is more common than to hear young people, especially females, in the morning and early part of the day, complain of distressing headach. If you ask them the cause of their complaint, in nine cases out of ten, they ascribe it to indigestion. It is a placebo to their minds to be able to assign so apparently satisfactory a cause for their disorder. But in my opinion, there is not one of "the ills to which flesh is heir," more belied than this very disease; and in many of the cases which we see described as idiopathic or primary forms of dyspepsia, on more minute inquiry, and closer investigation, both of the symptoms and of the apparent causes, the stomach will be found to suffer merely by implication, and the indigestion is only symptomatic of disorder of the brain or spinal system. This applies, in particular, to our present subject, and, as far as my experience goes, I perfectly coincide with Dr Copland in the opinion, that the digestive organs are considered much too generally as the source of the disorder.

Mothers pay the most religious attention, of late years, to the quantity, but not to the quality, of the food given to their daughters, as soon as the menstrual flow has commenced. It is right that attention should be paid to this important point, at so critical a period of woman's life; and no doubt much good would arise from it, were it not, that the spirit, which actuates this apparently laudable parental care, receives in too many instances an injudicious direction from mistaken views on the standard of female beauty, and imperfect information on the best modes of attaining that object. It is not so much from a spirit of economy, or from solicitude as to the future health of her child, as it is with a view of graduating her figure, according to the scale of fashion of the day, and of keeping the *embonpoint*, should there be a tendency to fulness of body, rather under than over the mark, that the anxious parent distributes with scrupulous exactness, a few thin slices of bread and butter, and a cup or two of tea as the morning repast, for a young woman of perhaps sixteen or seventeen years of age.

The *inanition* and feebleness consequent upon this fashionable starving system, together with want of proper exercise, tight lacing, &c. necessarily render the body susceptible of a series of evils, one or other of which is sure to occur on the slightest exposure to exciting causes. In such cases the blood becomes impoverished, and is wholly inadequate for the great demands made upon it, by the different organs of the body, both internal and external, at a period of life, when it is absolutely necessary for the future well-being of the individual, and for an equally important prospective consideration, viz. the health of her offspring, that the functions of nutrition should not only be unimpeded and undisturbed, but should be encouraged and assisted in the performance of their duties. The blood being deprived of its healthy constituents, and, consequently, in a great measure, of its *stimulating* properties, the circulation languishes; there is no reaction in the capillary system; hence cold hands, feet, &c. The brain is no longer supplied by that stimulus which it requires for the healthy performance of its vital functions, as well as for the due manifestation of the intellectual faculties. It fails to transmit to the stomach the normal and required nervous influence; hence the functions of this organ become deranged, and symptoms of dyspepsia take place. This derangement is reflected upon the cerebro-spinal system, and the primary disorder of the brain is then daily and hourly maintained and aggravated by the derangement of the stomach, which is altogether a secondary or purely symptomatic affection.

Young people who have been subjected to this extenuating system of dietetics gradually become debilitated both mentally and corporeally. The head affection, which at first is comparatively slight, and recurs only at remote distances of time, soon increases in severity and in the frequency of its attacks; and when the patients have arrived at the years of maturity, from the progressive derangement of the organic system, they are rendered so susceptible of morbid impressions, that in many instances they become martyrs to nervous headach, dyspepsia, hysteria, and similar disorders.

The countenances of those individuals are quite characteristic. The eyebrows are depressed; the eyes are sunk and look glassy; the cheeks are blanched; the lips are bloodless; the entire face wears the aspect of irritability, and denotes an incapability of action; and the favourite position of persons so affected, is sitting, with the head leaning upon the hand, being glad of the soothing effects of the support and pressure obtained by this means. Before breakfast and in the forenoon are the periods they are most usually attacked with headach. They describe the pain as dull and aching, but steady and uninterrupted, either by intervals of ease, or exacerbations of suffering. They experience an indescribable sensation, as if there were some effort being made to press the temples together. They complain of faintness and weariness, and incapability of speaking, or of exertion of any kind, and suffer more or less from that extreme intolerance of light and sound so strikingly apparent in other forms of cephalalgia. The attack may last for an hour, or a day, or longer; but it is invariably prolonged and aggravated by purgative medicines, when they are had recourse to with the view of curing the complaint.

2. Debility consequent upon nervous exhaustion. The second condition of body mentioned at the beginning of this paper, as connected with nervous headach, is by far the most fruitful source of the complaint. The *moral* exciting causes of this state are numerous; anxiety, affliction, dissipation, grief, despondency, mental fatigue, disappointment, sudden reverse, despair, &c. In short, all the passions which tend to depress the vital powers induce a state of nervous exhaustion. There is in this variety also a certain degree of anæmia; but it arises from different causes from the former, and is principally confined to the cerebral organ. Both conditions, however, are the sequences of debility, or vital depression, arising chiefly in the one instance from a physical, and in the other from a moral source.

Individuals of more advanced years than the former class, of the nervous temperament, and of a high state of sensibility, are those who suffer most frequently from this variety. They are, from the peculiarity of their constitutions, predisposed to cerebral disorder, and, when circumstances occur, tending in the slightest degree to depress or exhaust the vital powers, cephalalgia soon appears as the first link in the catenation of evils that is sure to accrue, if the causes inducing this state of nervous debility are sufficiently prolonged. They describe the pain, in severe cases, as racking and exhausting, with occasional acute twitches, and excruciating exacerbations, which are generally induced by motion, by sound, or by increase of light. There is also vertigo or giddiness; the sight is dim and confused, and black spots are seen rolling before the eyes. They are wholly incapable of thought or of any exertion whatever. They are sad, morose, and irritable in the extreme, and seek in repose, in silence, and in solitude for an alleviation of their sufferings. The countenance of the patient is expressive of the most supreme misery. It indicates melancholy and despondency, and sometimes even assumes a suicidal aspect; and this outward and visible picture is too often a faithful indication of the feelings and emotions of the mind. Harassed by a succession of gloomy thoughts, abject fears, and dread of madness, the martyr to nervous headach frequently experiences in the paroxysms of the complaint an indescribable sensation of weariness of life, and feels as if the only relief to be obtained from his afflictions was to be found in the oblivion of the tomb. As I have already said, the workings of the moral feelings are stamped upon the countenance; and in severe attacks, the drooping of the head and features, the furrowing of the cheeks, and the dragging of the commissures of the lips and eyelids, heighten the picture of wretchedness.

The foregoing category of human miseries, as connected with so apparently trivial a disease as nervous headach, may appear somewhat exaggerated. But daily experience shows that they are no creation of the imagination;—they are drawn from living pictures.

In addition to the symptoms already enumerated, there are sleeplessness; complete loss of appetite, or rather disgust of food; foul taste in the mouth, from the sympathetic affection of the stomach; and sometimes thirst. The pulse is quick, small, and always compressible. The urine is pale and limpid; and the bowels are frequently torpid.

II. *Treatment.*—The remedies that have been recommended as infallible in the treatment of cephalalgia are as numerous as the writers on this important and interesting subject. Every author has his specific, and every practitioner has his favourite remedy to extol, as the only safe, proper, and effectual means of averting the pain, and dispelling the gloom of the nervous invalid.

Dr Robert Whytt, in his Treatise on Nervous Disorders, strongly recommends valerian to the extent of three drachms a day in headaches; also gentle exercise, and washing the head with cold water every morning.

Tissot states that vomiting must be encouraged in those cases where it is threatened.

Joseph Frank, (Prax. Med.) recommended narcotic cataplasms to be applied over the painful parts.

M. Pariset, in an article on cephalalgia (*Dict. des Sciences Medicale*, Vol. iv.) regards the complaint as symptomatic of some other affection, and consequently concludes, that the remedial measures should be directed towards the primary disease, where-ever this may exist; whether in the brain, stomach, or bowels; and maintains that when the primary disorder is removed, the headach will soon disappear.

No person will deny that headach is frequently a secondary, symptomatic, or sympathetic affection; but, in admitting this, it by no means follows, that it is never a primary or idiopathic disease. The contrary, I believe, is now well ascertained, and admitted by late writers on the subject. In reading over the essays of several writers on headach, it appeared to me that different varieties of the complaint were frequently confounded with each other; and it was by no means easy to identify the individual form of the disease from the history of the symptoms, and description given by the author. For example, in Dr Warren's otherwise excellent paper (Med. Trans. Coll. Physicians, Vol. iv.) we have a most graphic description, under the head of dyspeptic or bilious headach of all the symptoms of the nervous variety of the disorder; and M. Pariset does not attempt to individualize the different forms of the complaint; he merely gives a running sketch of the whole, and omits giving the data whence he was enabled to conclude that it was a symptomatic disease.

M. Georget states, (Dictionnaire de Medecine, Vol. iv.) that compression of the head is frequently attended with great benefit in cephalalgia. In the sick headachs of females, especially during the menstrual periods, I have found this remedy of the most incalculable service in relieving pain. The pressure may be produced either by the hand of an attendant, or with a towel bound tightly round the head, over the part affected. M. Georget is likewise of opinion that stimulants and antispasmodics may occasionally calm an exacerbation of headach; but if these remedies are continued for any length of time, they will invariably aggravate the disease. Time, abstinence, and tranquillity, he further adds, are the best curative means to be relied upon in the periodic form of cephalalgia, and it was by their agency that Marmontel was, after the lapse of years, enabled to get rid of this infirmity.

M. Jolly (Dict. de Medecine et de Chirurgie Pratiques, Vol. v.) judiciously points out the importance of ascertaining the organ primarily affected before commencing the treatment, and adds, that, in those instances where the headach evidently arises from chronic inflammation or alteration in the substance of the brain, or in the meninges, blisters, and setons applied to the back of the neck, cauteries to the arm, and even the moxa to the neck and synciput, have been severally recommended, and found beneficial in certain varieties of cephalalgia. Further, in the periodic forms of the complaint, no remedies have proved to be of such signal benefit as the sulphate of quinine combined with opium.

Aconite.—I propose here to direct the attention of the profession to a drug, viz. the extract of aconite, which I have found extremely beneficial in relieving the pain, and in warding off the attacks of nervous headach. I think, it necessary, however, to premise my observations by stating, that I have no peculiar doctrine to advance or support regarding the *modus operandi* of this medicine; nor is it my intention or desire to extol it as a specific in the disease. A few remarks, however, on the genus aconitum are indispensable in this place.

The whole of the family of the aconites are poisonous. Some, however, are much more so than others, as the *Aconitum ferox*, which is used by the natives of India to poison tanks of water to check the progress of an army. This attempt was actually made, according to Dr Wallich, in the Nepal war; but was discovered in time. It is also used by the natives for poisoning arrows. The poisonous properties of aconite were confirmed on a large scale by experiments made with it on condemned criminals at Prague, and also at Rome. Two of these unfortunate beings were saved by medical means, after having undergone the most dreadful torments. Paralysis, vertigo, convulsions, horror of mind, occurred in one case, and the recovery was attributed to the early vomiting after the exhibition of the poison. In one of the two who died, no bad symptoms occurred after a drachm had been given, and he had retained it for half an hour. Matthiolus then gave him a portion of the leaves and of the stem. He shortly after became idiotic; a cold sweat bedewed his face, asphyxia, spasm, fainting, involuntary stools, bilious and livid vomiting, loss of speech, and death by apoplexy were the results.*

Notwithstanding the poisonous properties of aconite, it was recommended by Stoërck as a remedy in rheumatism, and a variety of painful disorders; and he boasted of its remedial powers in amaurosis, scrofula, cancer, syphilis, intermittent fever, &c. Busch and Portal have prescribed it in certain forms of consumption; Avicenna recommended it in cases of lepra; and Dr A. T. Thomson has administered it with advantage in inveterate psoriasis. The aconites, however, have never been much used in this country. At the time when the Brunonian doctrines prevailed, both aconite and hemlock were regarded as powerful stimulants; but as soon as the principle of counter stimulus was discovered by the celebrated Rasori, this theory was over-thrown, and comparative experiments conducted subsequently to that period by Tommassini induced him to attribute directly opposite effects to these remedies. He also found the most beneficial results arising from the administration of aconite, in cases where opium produced nocturnal restlessness, dryness of fauces, and general irritation; and gives an interesting case of tubercular consumption, the suppurating process going on at the time, in which the pain of chest and harassing cough were materially alleviated by aconite, when opium was inadmissible from the above-mentioned causes. In cases of herpes, he found the itching and heat of skin, which were invariably increased by stimulants, as ammonia, camphor, &c. relieved by the use of aconite.

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* See Matthiolus's Commentary upon Dioscorides; also, the Sepulchretum of Bonetus, where cases of a similar nature are related.

The reputation of this drug was declining on the continent, where it gained all its fame, until Dr Lombard of Geneva instituted some experiments with a view to prove the efficacy or inefficiency of aconite in certain diseases, for which it had been recommended by Stoerck, Van Swieten, and others, as a specific. In France, the failure in producing a good effect was invariably attributed to the injudicious means employed in obtaining the extract. In this country, it is also most difficult to procure a preparation of aconite on which reliance can be placed, which is perhaps in a great degree owing to the drug being so seldom used. It is needless to add, that the extract ordered by our Pharmacopœia, which, I believe, is intended as a substitute for the preparation first introduced by Stoerck, requires to be fresh, in order to give its remedial powers a fair trial in any of the diseases for which it has been recommended. By long keeping, this extract undergoes decomposition, and changes from its natural colour, which is yellowish, to a dark-brown or black; and hence the latter is most frequently the colour of the preparation found in the shops.

Dr Lombard employs an alcoholic extract of aconite, and considers that it acts specifically in certain forms of rheumatism, and also in gout. Some of his patients expressed themselves as greatly relieved from their sufferings within an hour from the time of taking medicine. The symptoms to which it gave rise were a certain degree of excitement of the brain, marked by a degree of gaiety, great vivacity, and nocturnal visions.* He did not perceive any disagreeable effects arise in a single instance, although he has administered as much as a drachm and a-half in twenty-four hours.†

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* Edin. Med. and Surg. Journal, Vol. xliv. p. 542.

† The physicians of the Bourdeaux Hospital had long been in the habit of administering the alcoholic extract of aconite in cases of neuralgia, chronic rheumatism, &c. in doses of from three to ten grains within twenty-four hours, without perceiving any disagreeable symptoms arising from it. They had lately, however, procured from the druggist some fresh extract, of which they gave doses, of five grains each, to three patients—one of whom died three hours after taking the medicine, with all the symptoms of poisoning by aconite. The others recovered, chiefly through the means of the free exhibition of stimulants.

During my attendance at the Hospital of St Louis, Paris, M Jobert administered with advantage the extract of aconite in neuralgic cases. My friend Dr P. Hennis Green informs me that he has found this preparation of signal benefit in several nervous and spasmodic affections; and I shall conclude my remarks on the drug by stating, that for some years I have paid much attention to the action of aconite in nervous cases, and the successful results of my observations in the majority of instances justify me in recommending it to the notice of the profession. In nervous headach, especially, I have found it of incalculable service in relieving that agonizing, harassing, and depressing pain, to which the invalid is a martyr, and which almost renders life a burden; and the beneficial effects of aconite are not confined to the particular forms of headach described in this paper, as will be seen and illustrated by cases in the sequel. I do not pretend to say that this remedy alone is sufficient to combat the different forms of the disease described, for it is obvious to all, that, in addition to the remedial measures of medicine, there are others of paramount importance to be kept in view, namely, attention to the quality as well as to the quantity of the food, exercise, graduated according to the circumstances of the case, and the urgency of the symptoms; and in debilitated females, a course of calisthenics, commencing with the slow oscillatory movement produced by the swinging of a rope, as urged by Mercurialis, the most gentle of all exercises, will be found of great advantage. Occasional change of air; and, above all, in cases where the disease is of long standing, cheerful society or cheerful companions are indispensable, in order to keep in check, if not to subdue, that settled gloom which follows in such instances severe attacks of cephalalgia, and continues for hours or even days, depressing the spirits, and prompting the individual to commit suicide.

III.—I shall now, in conclusion, briefly relate three cases of nervous headach that have been treated with the extract of aconite. It is, however, to be understood that they are not intended as illustrations of that particular form of the complaint described at the beginning of this paper. They are given merely to show that aconite may be administered with advantage in other forms of the same disease.

Case I.—E. R. a healthy female, aged 24, unmarried, of a nervous temperament, and high state of susceptibility, was extremely subject to headach. She otherwise enjoyed perfect health. The only cause she could assign for the complaint was sudden change in the atmosphere, as she invariably had an attack at the commencement of rainy and cloudy weather. Menses perfectly regular; no derangement whatever in the organic functions; feels wretched and miserable as the attack sets in. During its progress an overwhelming sensation of depression ensues, giving rise to gloomy thoughts and disinclination to move; incapacity for any exertion, either mental or physical; general irritability, &c. The pain is more of an aching, racking, and oppressive, than of a burning or lancinating character, and is continued. It is also confined to the synciput; there is loathing of food, but no sickness of stomach. The urine is copious and limpid, and the bowels are not confined. States that she has tried a variety of remedies, as cupping, leeching, bleeding, cold lotions, blisters, courses of opening medicine, &c. From some of these she derived occasionally slight temporary relief, from others none at all.

Her bowels being gently opened with the aloes and myrrh pill, I ordered ten grains of the extract of aconite to be made into twelve pills with liquorice powders, one of which she was recommended to take every two hours. When she had taken three of the pills, she experienced a kind of giddiness and tingling sensation about the ears, temples, and forehead, together with slight trembling of the tongue. This state of feeling did not continue for more than five or six minutes, and when it altogether subsided, the patient felt considerable relief from the depression and pain caused by the headach. She continued, however, to take the remainder of the pills, but the giddiness and tingling sensation just noticed were not so apparent at any subsequent period. She felt so much relieved by the medicine that she did not require to continue the pills any longer, and after the lapse of six weeks, she stated that she felt perfectly free from those distressing headachs from which she had long suffered.

CASE II.—I have received the following case from Dr R. Bateman, who tried the aconite, on my recommendation, in cases of nervous headach. It is dated October 1837. Mrs Martin, aged 36, a woman of spare habit of body, and of a nervous temperament, has been long subject to frequent attacks of headach, which come on almost periodically, and last for two or three days. She has been in the habit of taking two or three aperient pills, containing a small quantity of blue pill, whenever she suspected an attack to be coming on, and sometimes received temporary relief from the remedy, but nothing further. Menses regular.

I resolved to try the effects of the aconite in this case, and ordered her five grains of the extract, to be divided into six pills, one to be taken every three hours; but, owing to some mistake on her part, she took two at a time in place of one. However, the error was attended with no ill consequence, for she expressed herself not only relieved, but cured of her headach by the medicine. I saw her some time after this, and she stated that she had only one mild attack since taking the aconite. In the same space of time previous to taking this, she would have had several attacks.

My friend, Mr G. A. Walker, has found this remedy of much avail in his practice in cases of nervous headach. He also tried it on my recommendation. I shall here quote one of the cases his assistant, Mr Newstead, has kindly afforded me. The headach is in this instance combined with neuralgia.

Case III.—Jane Conlaw, a shop woman, 25 years of age, unmarried, of a nervous temperament, pale complexion, and large head, suffered much from headach and nervous affection of the face during the last five years. Other members of her family were similarly affected. She complained on her first application, eight months ago, of acute darting pains along the course of the nerves of the face, with the most depressing headach. The condition of the visceral functions was perfectly normal; menstruation natural. She was directed to take the following medicine :

℞ *Potass. Iodid.* ℈i. ; *Vini colchici* ʒii. ; *Mist Camph.* ℥vi. M. ℥i. *ter in die sumend.* with the following powder, ℞ *Hyd. Chloridii*, gr. i. ; *Pulv. Digitalis*, gr. i. ; *Pulv. Ipecac. Comp.* gr. viii. *M. h.s.s.*

This treatment was continued for seven days without the slightest benefit to the patient. She afterwards went to the Charing Cross Hospital, where she was treated for some time, but without experiencing any relief from her headach. She applied to me again about a month after leaving the hospital, in precisely the same state as she was in when first I saw her. The visceral functions were as before perfectly healthy. Having opened the bowels with a common aperient, I ordered her *Extract. Aconite* gr. iss. to be taken every six hours. She felt great relief from the pain in the head and face, even when she had taken but three doses of the aconite. She, however, continued the remedy for three days longer,—four days altogether,—at the end of which she stated that she was perfectly well and free from all headach.

To the present date, (November 8th 1839,) a period of six months since she was under treatment, she has not had the slightest return of the complaint.

I have given the last two cases to show that aconite has been found equally beneficial by other practitioners, as by myself in the treatment of cephalalgia. I am aware, as has been already stated, that Stoerck, who first introduced this medicine into use extolled its remedial powers in a variety of nervous complaints, and also that Vogel recommended its employment in rheumatic headach. Nevertheless, as aconite is not frequently employed now-a-days in cases similar to those which I have had the honour of relating to the society, I trust that my fragment will afford some little interest to the members ; and be the means of eliciting from them their opinions regarding the use of this drug in the different varieties of nervous headach.

23, Tavistock Place, Tavistock Square,
January 1840.

ART. IX.—*On the Action of the Hydrated Sesquioxide of Iron on Arsenic.* By DOUGLAS MACLAGAN, M.D.F.R.C.S.E. Lecturer on Materia Medica, &c. (Read before the Medico-Chirurgical Society of Edinburgh, 10th March 1840.)

THE hydrated sesquioxide of iron was first proposed as an antidote for arsenic by Drs Bunsen and Berthold of Gottingen, who published a pamphlet on the subject in Germany. The importance of the question led many experimenters, especially on the continent, to put its powers fairly to the test, and there seems little reason to doubt that when administered in sufficient quantity, it either arrests or totally prevents the action of the poison on animals. The following experiments were instituted with a view to throw some light on the *modus operandi* of the antidote, by investigating the chemical action of the hydrated oxide on arsenic. I considered it unnecessary to sacrifice any more animals to experiments with arsenic, as the numerous trials of this kind that have been already made, and which have been collected by Dr Donald Mackenzie in his probationary essay on the Antidotes to Arsenic, appear to me to be quite satisfactory. In this country the efficacy of the oxide of iron as an antidote, and its power of combining with arsenic have been called in question by Messrs Brett[*] and Orton.[†] But with respect to the former, it may be observed, that he appears uniformly to have used too small quantities of the oxide; and the experiments of the latter hardly seem to have been made with sufficient care, as appears in one instance, at least, from his having injected both poison and antidote into the lungs instead of the stomach of the rabbit.[‡]

It has been supposed by some that the oxide may prove preventive of the action of the arsenic mechanically, as charcoal has been found to do, by enveloping the poison, and protecting the stomach from its contact, and the large quantity in which the oxide requires to be employed, naturally favours such a supposition. It has been found, however, that the hydrated sesquioxide of iron has the power of removing arsenic from its solutions in water, and from this we are led to infer that it has really the power of combining with the poison, and rendering it insoluble. In order to remove the arsenic totally, a large amount of oxide requires to be employed. Mr Brett did not succeed in doing so when he used eight or ten grains of oxide to one of arsenic; but Dr Mackenzie removed arsenic completely from its solution, when he used the proportion of twelve grains of oxide to one of arsenic.

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[*] Medical Gazette, 1834–35; p. 220.

[†] Lancet, 1834–35. p. 232.

[‡] The hydrated sesquioxide has been introduced into the New Edinburgh Pharmacopœia under the name of Ferrugo, and is prepared by dissolving sulphate of iron in water with a little sulphuric acid, adding nitric acid by degrees till it is thus fully oxygenated, and then precipitating the hydrated sesquioxide from this solution by an excess of ammonia. The product thus obtained is of a deep reddish brown. If dried cautiously at a temperature not exceeding 180°, it retains according to the Pharmacopœia, about 18 per cent. of water, and it is likewise found that, however well it may be washed, it still retains a small proportion of ammonia, which may be driven off by further exposure to heat. It is found to answer best as an antidote when kept in the moist state, being then in the finest possible state of division. That which I used in the following experiments had been expressed after washing, and contained in 100 grains of the mass a quantity equivalent to 20 grains of the oxide dried at 180°.

The following experiments will show the results which I have obtained from parallel trials.

Expt. I. One grain of arsenious acid dissolved in water was, when cold, agitated for a few minutes with a quantity of the magma equal to about four grains of dry oxide, filtered and tested. The fluid was found to indicate arsenic distinctly on applying the usual tests. The remainder of the solution was retained on the ferrugo, and left in contact for eighteen hours, when it was found that the arsenic was completely removed.

On repeating this experiment several times, the result was not always the same. In all the instances, traces, more or less distinct, of arsenic, were detected in the filtered fluid; but I did not always succeed in completely removing the arsenic, by leaving them in contact for eighteen hours. These variations were probably owing to some portions of the magma being less completely expressed than others, and therefore containing in a given weight a smaller amount of oxide.

These trials agree in a great measure with the experiments of Mr Brett. It was obvious that the whole of the arsenic could not be removed by this amount of oxide; but it was equally evident that a considerable proportion of it had disappeared, for on comparing the amount of precipitate produced in the filtered liquid by sulphuretted hydrogen, with that obtained by the same reagent in an equal bulk of water containing about a tenth of a grain of arsenic, the latter had always a much deeper yellow colour.

I found likewise, like Mr Brett, that when these proportions had been employed, the oxide retained on the filter, after being washed free of adhering arsenic by cold water, yielded it readily to that fluid when poured upon it at a boiling heat, and, moreover, that very little arsenic was removed from the solution, if it was used at a temperature of 98°, and that a large amount reappeared in the fluid, if it was returned upon the ferrugo, and retained some time at that temperature.

The proportion of oxide of iron here was five times more than should have been required to saturate such an amount of arsenious acid, supposing them to form an arsenite of iron containing equal atoms of its constituents, yet it did not remove all the arsenic; and, moreover, what it had removed, was easily separated from it by water at the natural temperature of the stomach. Mr Brett was therefore not wrong in supposing that (in such proportion, at least,) the oxide could not be administered as an antidote to arsenic with any chance of success.

The result, however, was different when the oxide was employed in larger quantity.

Expt. II. One grain of arsenic dissolved in water was, when the fluid had cooled, agitated with a quantity of the magma containing twelve grains of the oxide. The filtered liquid in several different trials in no instance indicated more than a very indistinct trace of arsenic when tested with sulphuretted hydrogen, and generally it was found not to afford the slightest indications of its presence, and this occurred at a temperature of 98°, as well as in the cold.

The oxide retained on the filter, moreover, did not readily part with its arsenic to boiling water. When simply washed on the filter with boiling water, little or no arsenic was removed from it at all, and it appeared to retain it with so much force that it was with difficulty separated even when boiled for half an hour in a very large bulk of water. It thus appears that when in large quantity, the hydrated oxide of iron has the power of removing arsenic completely from its solution in water, and that it retains the arsenic with such force as to render it *à priori* probable that it should from its insoluble condition be rendered inert.

Expt. III. The oxide carefully dried at 180° was likewise tried, and was found to withdraw arsenic completely from its solution. Sixty grains of this dry oxide were found to remove completely one grain of arsenic, but it was obviously very inferior in power to what it had been when in the form of magma, for twelve grains of the dry oxide appeared to produce little or no diminution in the quantity of arsenic in solution, twenty-four grains even when left in contact for half an hour had not removed any considerable quantity, and it was not until thirty-six grains of the oxide had been used and left in contact for half an hour, that any very marked removal of the arsenic appeared to have been obtained.

Expt. IV. Being anxious to ascertain whether the oxide of iron was capable of removing arsenic from its soluble combinations, as well as from its solution in water, half a grain of arsenic in the form of arsenite of potassa was agitated with a quantity of the magma equal to about eight grains of the dry oxide. On applying the sulphuretted hydrogen test to the filtered fluid it gave a very indistinct trace of yellow. For comparison, one drop of a solution of arsenite of potassa, equal to only the sixtieth of a grain of arsenic, was tested in an equal bulk of water, and gave a much deeper yellow tinge. It thus appears that the oxide of iron has the power not only of removing arsenic from its solution in water, but also of decomposing arsenites,—an effect which must be considered to be due to a real chemical combination of the oxide of iron with arsenious acid.

The oxide of iron thus appears capable of forming an insoluble, and, as appears from other experiments,* inert compound with arsenious acid. It is well known, however, that when arsenite of potassa and persulphate of iron are mixed an arsenite of iron is formed of very different qualities. This arsenite has a canary yellow colour, is soluble in acids and ammonia, and when treated with boiling water, as appears from Mr Brett's experiments, parts with a portion of its arsenic, and passes to a brick brown colour. This yellow arsenite, moreover, has been found to be highly poisonous. The brick brown matter left on the filter, even when hot water has ceased to act upon it, retains, as Mr Brett has shown, a proportion of arsenic. No attempt has been made to ascertain whether this last form of combination of arsenic and iron is poisonous, but the experiment might be of interest, as this brown substance, obtained by washing the yellow arsenite with boiling water, appears to retain the arsenic in a condition very similar to that in which it is placed when removed from its solution by a large quantity of the hydrated sesquioxide.

The presence of ammonia appears to have some effect in modifying the combinations of arsenious acid and iron. When the yellow arsenite of iron is dissolved in an acid and reprecipitated by the addition of aqua potassæ, it appears, as before, of its characteristic yellow colour; but when a similar solution in acid is neutralised by ammonia, the precipitate, instead of being yellow, has always a dirty brown colour. When this is connected with the fact that the oxide, when precipitated by ammonia, always retains a portion of that substance in spite of most careful washing, it leads to the supposition, that the presence of ammonia may be of some importance in determining the powers of the hydrated oxide as an antidote. Such seems to have been the opinion of Dr Bunsen, who administered a portion of ammonia along with the oxide; but this has been shown by other experimenters to be unnecessary. It has been supposed that the presence of ammonia in the oxide was essential, and that, therefore, the oxide, when intended for an antidote, should always be precipitated by that substance; but I find that even when precipitated by potash, the oxide still has the power, though in a very inferior degree, of removing arsenic from its solutions.

Expt. V. One grain of arsenic in solution was agitated with a quantity of moist oxide precipitated by potash, equal to 14 grains dry oxide. The fluid was found to retain distinct traces of arsenic; but when the amount of oxide was equal to 24 grans dry oxide, the arsenic was completely removed. This was equal to twice the amount required when the oxide had been prepared by ammonia and used moist, but much less than what was necessary when the dried ammoniacal oxide had been employed.

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* Lancet, 1834-5. British and Foreign Medical Review, Vol. i.

Having by these various experiments satisfied myself that the hydrated sesquioxide of iron in its different conditions has the power more or less of combining with arsenic and rendering it insoluble, I instituted a series of experiments to ascertain if possible with more precision in what proportions the oxide should be employed to remove the arsenic completely. For this purpose I prepared two solutions, the one of arsenite of potassa, the other of persulphate of iron, of such strengths that an equal bulk of each should contain respectively arsenious acid and sesquioxide of iron in atomic proportions. The solution of iron was purposely made with an excess of acid, in order that any yellow arsenite of iron which should be formed on mixing the solutions should be redissolved. The superabundant acid was then to be saturated by ammonia in excess, by which means I proposed to separate the oxide of iron in determinate proportion, and ascertain in what ratio it required to be employed, completely to remove the arsenic. The following results were obtained.

Expt. VI. When the solutions of arsenic and iron were mixed in the ratio of one proportion of each, the yellow arsenite was at once formed, but was immediately redissolved by the excess of acid. On adding ammonia in excess, a yellowish-brown precipitate was obtained, and the filtered fluid was pale orange. In this case, arsenite of iron had been thrown down, and again partially redissolved by the excess of ammonia. On boiling this solution the dissolved arsenite of iron was, on the expulsion of the ammonia, separated, and then by the boiling water decomposed, apparently in the same way in which the yellow arsenite is decomposed by washing with boiling water; a clear fluid being obtained containing arsenic, but no iron, and a dark-brown flocculent sediment being separated, still retaining a considerable proportion of arsenic.

Expt. VII. When the solutions of arsenic and iron were mixed in the ratio of two of the former to one of the latter, the yellow arsenite was at first formed, and immediately redissolved by the excess of acid. On adding ammonia in excess, the yellow precipitate reappeared, but was soon completely redissolved by excess of ammonia; the solution was of a dark orange colour, and was decomposed by boiling like the dissolved portion in last experiment; but with much greater difficulty, a large amount of iron remaining dissolved in the fluid for some time. Eventually, however, the whole of the iron was separated by boiling, and formed shining brown flakes, which retained likewise a large amount of arsenic.

Expt. VIII. When the solutions were mixed in the ratio of two of iron to one of arsenic, and ammonia added in excess, the precipitate obtained was of a dirty brown colour; the filtered fluid had a faint yellowish tinge, and obviously contained a small proportion of arsenite of iron dissolved by ammonia.*

Expt. IX. When three proportions of iron and one of arsenic were employed, and excess of ammonia added, the filtered fluid still contained arsenic distinctly, and a very faint trace of iron. The precipitate in external appearance resembled the ferrugo itself, and readily yielded a large amount of arsenic on washing it with boiling water.

Expt. X. The solutions of iron and arsenic were mixed in the proportions of four of the former to one of the latter, and ammonia added. The fluid separated by the filter was quite colourless; it contained distinct traces of arsenic, but no iron. The precipitate was like ferrugo in appearance, and yielded arsenic copiously on washing with warm water.

Expt. XI. Eight parts of the solution of iron to one of the arsenic were the proportions now mixed, and ammonia added. The filtered fluid contained an indistinct trace of arsenic, but no iron. The precipitate, which in external appearance resembled the last, gave no arsenic to cold water, and yielded it very sparingly to that fluid when boiling hot. Even by boiling it did not yield the arsenic so readily as the precipitate in Expt. X. did when merely washed with boiling water.

Expt. XII. When the proportion of oxide of iron to the solution in arsenic was as twelve to one, and ammonia added, the filtered fluid was found to contain neither arsenic nor iron, and the precipitate yielded a bare trace of arsenic to warm water when poured on it.

From this last series of experiments, we learn that the state of combination of the oxide of iron and arsenious acid varies remarkably according to the relative proportions of these two substances. When the proportions are as atom to atom, an arsenite of iron is formed, which is soluble in ammonia and readily decomposed by boiling-water, and the solubility in ammonia is increased when the arsenic is in the ratio of two proportions to one of iron. When the oxide of iron is to the arsenic as three or four to one, the compound is still partially soluble in ammonia and readily decomposed by boiling water; but when the iron is further increased in quantity, as when the ratio is eight or twelve to one of arsenic, not only is all the arsenic removed from the fluid, and the precipitate insoluble in ammonia, but the iron retains the arsenic with such force that it is hardly possible to separate it even by the affusion of boiling-water.

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* This solution gave a greenish-yellow tinge with sulphuretted hydrogen. When water contains yellow arsenite of iron suspended or dissolved in it, the colour struck by sulphuretted hydrogen is greenish-yellow, green, olive-green, or brownish-green, according to the amount of arsenite present.

From all these experiments I draw the following conclusions.

That the hydrated oxide of iron is a real chemical antidote to arsenious acid, and that when it removes arsenic from solution and soluble combinations it acts by chemically uniting with it.

That it appears much better fitted for removing arsenic, when it has been precipitated by ammonia than when precipitated by potash; and that it answers better when in the state of a moist magma, than when dried at 180°, even though, when thus dried, it still retains a considerable per centage of combined water.

That thus there appear to be good grounds for believing that in the experiments on animals, and the cases in the human subject, in which it has been found to arrest the action of the poison, that it acted as a chemical antidote and not as a mechanical protection to the stomach; that the large quantities which have been found necessary are required not to protect the stomach mechanically, but to render the poison chemically inert. That, as far as chemical evidence goes, at least twelve parts of oxide prepared by ammonia and moist are required for each part of arsenic,* and that when the oxide has either been precipitated by potash, or been dried even at a low temperature, that about three or four times larger quantities are requisite.

I have likewise tried, though without any view to their being employed as antidotes, the hydrated oxide of lead and the hydrated peroxide of mercury, but with neither could I succeed in removing arsenic from its solution. Neither was there any arsenic removed from its solution by charcoal, which in fine powder has been used as a mechanical antidote to the poison.

ART. X.—*Additional Cases of Diaphragmatic Hernia, and of Aneurism of the Aorta.* By JOHN REID, M. D. F. R. C. P. E.

THE following cases may be considered as an appendix to those contained in my communication in the Number of this Journal for last January.

Case of Diaphragmatic Hernia caused by external Injury.—John Henry, aged 34, admitted, 8th February 1840, under the care of Mr Fergusson.† About 8 o'clock this morning, while working at the Glasgow Railway about eight miles from Edinburgh, a bank of earth fell upon him, and almost entirely covered him. A few minutes elapsed before he could be disengaged from it.

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* This proportion of twelve parts of the moist ammoniacal oxide to each part of arsenic is that which has been indicated by several of the French experimentalists as being required to insure its antidotal effects.

† The following account of the symptoms on admission was drawn up by Mr Samuel Lewis, one of the House Surgeons of the Infirmary.

On admission into the Infirmary at four o'clock P M. his pulse was small, very rapid and feeble. The left radius was fractured close to its carpal articular surface, and its upper fractured extremity along with the lower end of the ulna was thrown forwards, and projected through a lacerated wound in the integument. Some of the lower ribs of the left side, and the eighth and ninth ribs of right side were fractured. There was some emphysema of the parietes of the chest, and the left side of chest was resonant on percussion. His respiration was oppressed; the face was pale, anxious, and somewhat livid. When Mr Fergusson visited the patient he saw that his condition did not justify the amputation of the fore-arm. The emphysema continued to extend, the dyspnœa became very urgent, and he died at half-past ten in the evening, having survived the accident about fourteen hours.

Sectio Cadaveris, 10*th Feb.*—The external parts of chest and neck were emphysematous; the abdomen was distended and tympanitic. On opening the abdomen, a small quantity of blood was found effused between the *fascia transversalis* and the outer surface of the peritoneum, and a few ounces of a thin yellow-reddish fluid flowed out. On opening the chest, some blood was seen to be effused in the meshes of the cellular tissue along the lower margin of left side of chest; and a band of muscular fibres, about two inches and a half in breadth, belonging to the anterior part of left side of the diaphragm, projected below the margins of the ribs. The left side of the chest was almost entirely occupied by the stomach, spleen, and about a foot of the transverse arch of the colon. The stomach was very large, being much distended with flatus; and it had compressed the lung into very small bulk, pushed it up towards the clavicle, and forced the heart into the right side of the chest. The stomach was placed obliquely in the left side of chest, and was rotated upon itself in the manner which occurs when distended in its natural situation, and the posterior surface of the organ occupied a large, irregular, lacerated opening in the left side of the diaphragm. This lacerated opening extended from the lateral parts of the lower margin of the left ribs to the left edge of the cordiform tendon, and was about four inches in the lateral direction, while in the antero-posterior it was considerably larger. The four inferior ribs of the left side were broken midway between their anterior and posterior extremities; and the *pleura costalis* was lacerated by the fractured ends. The eighth and ninth ribs of the right side were also broken about their middle, and the *pleura costalis* torn. About two ounces of a reddish fluid were found in the right side of the chest. Both lungs were inflated, but no rupture of the *pleura pulmonalis* could be observed, and the only anormal appearance remarked on the surface of the lungs was a small ecchymosed spot at the inferior edge of the left lung.

CASE II.—I am indebted to Dr Traill for the following case.

A slater in Liverpool fell from the roof of a house on which he was engaged, and his abdomen pitched on the curb-stone of the pavement. His leg was severely fractured; and he was carried to the hospital, when, after a consultation, it was decided that his only chance of life was amputation of the shattered limb; and, as the man in other respects seemed a healthy subject, it was soon performed. The patient, however, after the accident never had a stool; he could not eat anything, and liquids returned without retching. He did not complain of any considerable pain in his abdomen, or chest, but spoke of an uneasy soreness at the pit of the stomach, which he ascribed to ordinary bruises, which he had received when he fell; and he had considerable dyspnœa. He died suddenly.

Sectio Cadaveris.—On opening the body, the whole stomach and part of the duodenum were found lodged in the left side of the thorax. They were driven up through an aperture in the diaphragm, which so embraced the displaced portion of the intestines, that nothing could pass downwards; while compression of the œsophagus from the same cause prevented fluid from entering the stomach. There never was, after the accident, any attempt to vomit; but liquids were returned without any apparent effort. No singultus was observed during life.

CASE III.—*Aneurism of the Arch of the Aorta bursting into the pulmonary Artery.*—A gentleman, aged 53 years, who had been for some months complaining of slight bronchitic symptoms with some precordial uneasiness, was suddenly seized with violent dyspnœa, rapidly followed by insensibility, and in about four minutes from the commencement of the attack he was dead.

On examining the body about forty-eight hours after death, we found the following appearances. The heart and all its valves were healthy. That portion of the arch of the aorta between the upper part of the sinuses of Valsalva and the origin of the *arteria innominata*, was dilated into an aneurism capable of holding the fist. The dilatation chiefly projected to the left side, and there the coats of the artery were not only irregularly thickened but contained numerous yellow patches. The left side of the aneurism adhered firmly to the trunk of the pulmonary artery, and a ragged irregular fissure, nearly an inch and a-half in length, formed a free communication between them. The aneurism contained only a few small clots of fibrine. The lungs contained a very considerable quantity of blood and some serum.

CASE IV.—*Aneurism of the Abdominal Aorta bursting into the Vena Cava Ascendens.*—I was requested by Mr Ellis Woodhead, surgeon, and Dr J. Y. Simpson, to assist them in inspecting the body of a man, aged 52, who had died the day previous, and whose case promised to be interesting. Mr Woodhead informed me that this man had been a butler, and had been complaining for the last two years of severe pain of the back, stretching across the loins. While performing his usual duties after dinner, he felt suddenly indisposed, and Mr Woodhead was soon after sent for. On his arrival he found the patient labouring under violent vomiting and sickness, accompanied with general depression, and on placing his hand over the umbilical region, he felt violent throbbing of the abdominal aorta. He died at two o'clock next morning.

Sectio Cadaveris.—The lower part of the abdominal aorta was found dilated into an aneurism about the size of a small orange. Before proceeding to remove it, an opening was cautiously made through its anterior wall, and another opening was then made into the *vena cava ascendens*, opposite the upper part of the aneurism, and on introducing a finger into each of these incisions and moving them about, an opening was detected forming a communication between them. The aneurism adhered firmly to the anterior surface of the third and fourth lumbar vertebræ, upon which it rested, and the two primitive iliac arteries were seen issuing from its lower edge. The posterior wall of the aneurism, or that which rested upon the vertebræ, had been entirely absorbed, and there were several firm fibrinous layers occupying its place. The body of the fourth and the lower part of the third lumbar vertebræ were very deeply excavated by the absorption occasioned by the pressure of the aneurism, while the invertebral substance between them formed a white projecting ridge, and had apparently undergone no change. The communicating opening between the aneurism and vein was near the centre of the right wall of the aneurism, of an irregular form, passed directly between them, and would have permitted the passage of the point of the little finger. The whole calibre of the vein was slightly dilated at the part where the communication had occurred. The heart and other thoracic organs were healthy.

Art. XI.—*Influence of Respiration on the Motion of the Blood.* By G. Calvert Holland, M. D., Physician to the Sheffield General Infirmary.

Messieurs, n'oubliez pas que nous avons sans cesse à lutter contre des theories erronées, et que ce qui est tres simple sur la nature est devenu souvent très compliqué sous la plume des physiologistes. Magendie.

The writer, from whose pages this motto is taken, has established, by his own labours and contributions to science, the truth which it conveys. There is, indeed, no department of physiology, how zealously soever it has been cultivated, but what is disfigured by serious errors. Nor can this be a matter of surprise. The phenomena of life do not admit of exact calculation or refined analysis, and hence the study of them rarely affords clear and comprehensive views. The circulation is no exception to the force of these remarks. If errors on this important subject are to be inferred from the great discrepancies in the doctrines taught, they are certainly numerous and grave, for scarcely on any two points are physiologists agreed. According to the experiments and reasoning of one, the motion of the blood depends on the heart alone; according to those of another, the influence of this organ is arrested at the capillaries; according to those of a third, there are three causes in operation, the heart, the arteries, and the capillaries; according to those of a fourth, these causes are insufficient to urge the blood through the venous system, and the effect is ascribed to the agency of inspiration. Those of a fifth give a moving power to the blood itself.

These are only a few of the discrepancies taught. Were we to go into detail, they would crowd upon us at every step of the exposition. Were the circulation, from its abstruse or peculiar nature, insusceptible of experiments, such differences of opinion would properly be attributed to our imperfect means of investigation. But physiology scarcely offers a field of inquiry that admits more readily of the application of experiments than this; and there is perhaps none in which they have been so varied, or employed with equal ingenuity and tact. Nature, however, does not always yield up her secrets to such a rude mode of interrogation. Experiments are often the source of much error, and give it a permanence and injurious influence which reasoning alone would never confer. A writer of considerable analytical talent has forcibly expressed this truth.

"Experiments have doubtless contributed much to the progress of science; but how often is the mind led astray by their unsteady and deceitful light. Nothing is more difficult than to interpret accurately the equivocal language of experiments. Numerous circumstances, supposed void of influence, and the operation of which is overlooked, and many circumstances really void of influence, to which importance is attached, multiply the illusions in the inquiry. To be convinced of this, it is requisite merely to examine these circumstances critically as we have done."[*]

In the proposed undertaking, the object will be, not only to analyse several of the cardinal functions of life, but especially the experiments by which they are generally imagined to be elucidated. The exposition of error is next in importance to the establishment of truth. It clears the ground for subsequent and more fortunate labourers.

The sources of error are indeed various. The physiologist from whose writings the foregoing extract is taken remarks in reference to this subject.

"Thus all our errors proceed from suppositions. If we examine the systems of men, this truth becomes evident. The admission of a fact which has no existence is a supposition, and the rejection of a fact which is real is also a supposition. Nevertheless, if the mind follows the uncertain light of suppositions, to these its conclusions almost invariably bear a correct relation, and are then errors. It is therefore incumbent to resist this tendency to supposition."

"It is, nevertheless, improper to refuse all admissions in the dread of supposing too much. This excessive scepticism necessarily leads to errors. To refuse all evidence which does not impress the senses is unreasonable. There are, for instance, many secondary phenomena which proceed only from one primary effect; and we then infer the existence of the primary effect at the risk of retracting the inference, if it be proved that this secondary effect proceeds from another primary effect. Thus until we see fluids move of their own accord; independently of gravity, chemical affinities, and any extraneous agent, are we not assured that their agitation is due to one or other of these agents? That we do not see the capillary vessels would be an inadequate reason for pronouncing them habitually inactive on the blood which is moved through them; and we do not thus depart from the method of physical and chemical inquirers."[†]

The experimental physiologist too often flatters himself that his mode of investigation is open to few objections, appealing directly to nature. Were the subjects with which he deals susceptible of subtile analysis like the materials of the chemist, or the inquiries of the mathematician, his self-complacency would be well founded. The phenomena of life are, however, exceedingly complex, and so indissolubly associated, that it is difficult to select a portion for experimental investigation, without causing serious modifications in the character of the whole, but especially in those immediately under examination. The nature and extent of these modifications are seldom accurately understood or indeed analysed. The results to which the physiologist anxiously directs his attention are the absorbing objects of thought, and are too frequently reasoned upon with as much confidence as if evolved from the action of simple and inorganic substances. The phenomena are obvious to his senses, and hence are regarded as a faithful representation of the natural operations of the vital powers. How seldom does he take into account the disturbing or modifying causes flowing immediately from his interference! These are elements not at all submitted to analysis, nor are they allowed to affect his generalization. In evidence of the truth of this remark, it will be shown, that in many of the most celebrated physiological experiments, there is no anxious inquiry concerning the amount of derangement, either general or local, which they necessarily occasion in the system. The results sought are seized with avidity, and spun into theories with unhesitating boldness. If, in attempting to point out these defects, and the fallacious conclusions to which they lead, success does not invariably attend our labour, the instances of failure will not be altogether without their good. They will tend, from the spirit with which the investigation is conducted, to rouse and stimulate the mind to inquiry, to enlarge the field of its researches, to give an interest to subjects apparently barren or unimportant, and perhaps impart a stirring feeling of independence to the cultivation of physiology generally. The man who dares to think for himself, unbiassed by great names, has overcome the most formidable difficulties opposed to the discovery of truth. Among the many subjects which were suggested, as peculiarly fitted from their extensive relations and practical bearings for analysis, it was not long a matter of doubt which to select.

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[*] Essai de Classification naturelle et d'analyse des phenoménes de la vie, par P. N. Gerdy, Professeur d'Anatomie. Paris. p. vii.

[†] Opus cit. p. xi.

The circulation has high claims upon the consideration of the physiologist. It has an intimate relation to every vital operation of the system, and the knowledge of its modifications in many diseases suggests prompt and appropriate measures; and were it more accurate, the remedial art would lose much of its obscurity, and humanity would gain largely in beneficial results. The aim and scope of the inquiry will for the present be sufficiently understood, by stating the subjects and the order of their proposed investigation, which are as follows:—

Part I. Influence of respiration on the motion of blood.

II. The properties and influence of arteries on the motion of blood.

III. The influence of the heart on the motion of blood.

IV. The forces by which the blood is moved in capillary vessels.

V. The powers by which the blood is moved in the veins.

I. Though the influence of respiration has been deeply studied by many distinguished physiologists, there are points of considerable interest which have only been partially investigated, or which, indeed, are involved in much obscurity. Experiments have unquestionably proved, especially those of Magendie, Poiseuille, and Barry, that the motion of blood is greatly modified by respiration. There is certainly a serious discrepancy of doctrine concerning the influence of its two acts, inspiration and expiration. The two former teach that inspiration only facilitates venous circulation. Barry considers it, however, the sole cause. Previous to entering upon this part of the inquiry, the capacity of the arteries and veins immediately connected with the heart and lungs will properly form the first consideration. The greater capacity of the latter, as well as of the venous system generally, is familiar to all, but the fact has not been sufficiently seized to demonstrate, which it does, the provision made for the constant and equable supply of blood to the heart and lungs. By injecting an equal portion of the aorta and of the two *venæ cavæ*, near the heart, a general idea of their relative capacity may be formed. The experiments will show that the capacity of the two veins is at least twice as great as that of the aorta; and as they allow of considerable enlargement, the difference will occasionally greatly exceed this statement. The area of the venous system is greater than that of the arterial, in the proportion perhaps of three to one. The ratio between the capacity of individual arteries and veins in different parts is very various; between the carotid and internal jugular, 196 : 441; between the subclavian artery and vein, 3844 : 7396; between the aorta and *vena cava*, 9 : 16; between the splenic artery and vein, 136 : 676. Nature, by the greater capacity of the veins, has secured the powers of life from frequent and serious accidents. Previous to illustrating this fact, compare the capacity of the *venæ cavæ* with that of the pulmonary artery. The difference is great, and yet as much blood passes through the artery at each contraction of the right ventricle, as flows into the right auricle from the capacious veins, or into the aorta at each contraction of the left ventricle. The blood in these veins is moving slowly, for were it to circulate at anything near the same rate as the contents of the pulmonary artery or aorta, the right auricle would receive as much more blood as the capacity of the veins is greater than that of either artery. No argument is indeed required to show, that the same quantity of blood, in equal times, flows into the right side of the heart as passes out of the left. From these facts, it may be inferred,—

1st, That the blood is moving exceedingly slowly in the *venæ cavæ*.

2dly, That the quantity of blood immediately at their roots is much greater than is removed by any single contraction of the right auricle, and hence may be regarded as a reservoir at the right side of the heart.

The great difference in the capacity of the pulmonary artery, aorta, and *venæ cavæ*, must constantly be kept in view throughout this investigation; and also the fact, that the same quantity of blood passes in equal times through the two former, and from the latter into the right auricle. These are data from which important conclusions may be drawn. The structure and functions of the lungs clearly prove that they are designed to receive an immense quantity of blood. Were it possible to inject the pulmonary vessels in order to ascertain the amount, the experiment would not lead to any satisfactory results, as it would not determine the quantity ordinarily in circulation. The division of the lungs into an infinite number of cells, for the purposes of aeration, would lead to the conclusion, that they contain many times the quantity sent out by any single contraction of the left ventricle, so that these organs may be considered as a reservoir to the left side of the heart, or, in other words, the left ventricle would for some time be supplied with blood, were the contractions of the right to be arrested. This is not only a wise provision, tending to preserve existence under circumstances that would otherwise be fatal, but explains many interesting phenomena previously imperfectly understood. It has just been stated that, in equal times, as much blood is sent out by the left side of the heart as is received by the right. This is true only in health, or when the functions of the lungs are regularly performed. A disproportion in the amount transmitted and received, must necessarily take place in all cases of recovery from congestion of these organs. Before proceeding to show how this disproportion is liable to occur, it may be well to state what gave rise to the idea. Having observed the great difference in the capacity of the *venæ cavæ*, pulmonary artery and aorta, it was natural to compare the pulmonary artery with the pulmonary veins. Knowing that the latter receive, in the same time, only as much blood as the former transmits, though their capacity is greater, the question is at once suggested, what end is this greater capacity designed to serve? The superiority of the venous system, generally, is obvious, and universally admitted. The pulmonary veins are, however, alluded to by physiologists, as an exception to this prevailing preponderance. Their united capacity is regarded as only slightly, if at all, superior to that of the pulmonary artery. Attentive examination of these vessels will not be found to corroborate this conclusion. There is certainly some difficulty in making an accurate comparison, in consequence of the extreme shortness of the veins. The artery, from its strong parietes, exhibits after death its ordinary capacity, which, not being the case with the veins, the inference has been drawn, that the capacity of the two is equal. A close and accurate investigation will not establish such relation. Indeed, were direct evidence less decisive on this point, reasoning alone on the conditions of the blood in these two classes of vessels would render the opinion altogether untenable. The character of the stream emitted by the right ventricle differs very widely from that flowing through the pulmonary veins into the left auricle. The former is urged along its course by the strong contractions of the ventricle in quantity, and at a rate of motion nearly corresponding with the current ejected into the aorta. The blood which flows into the left auricle is derived entirely from the capillaries of the lungs, and consequently its motion is slow and equable; and yet the quantity conveyed in a given time into this cavity is identical with that transmitted by the right ventricle into the pulmonary artery. Hence the two streams; the venous which enters, and the arterial flowing towards the left auricle, are urged in their respective directions at a very different rate of motion. It will scarcely be imagined, that the venous moves at the same velocity as the arterial current. The greater capacity of the veins throughout the animal system is fully established, nor is it possible to imagine an exception to the law. The disparity is one of necessity. The blood which enters the aorta passes gradually into branches, the conjoint capacity of which increases as they multiply, until at length they terminate in capillaries, the capacity of which is immeasurably greater than that of the aorta. It is therefore evident that equal quantities of blood are moving in these two situations at very different degrees of velocity. The venous capillaries pour their contents into vessels, the aggregate capacity of which diminish as they decrease in number, until ultimately they form the two ample *venæ cavæ*. An equal quantity of blood is consequently circulating at a greater rate of motion in the latter vessels than in the venous capillaries; but how slowly compared with its course in the aorta! A difference in the capacity of the veins and arteries would naturally be inferred from the striking contrast in the relation of these vessels to the heart. The contents of the one are manifestly urged forward by its contractions, with great force and velocity. The contents of the other are far removed from this source of motion, and are separated from it by numberless capillaries, possessing a peculiar vital action, and unquestionably exerting an influence on the currents transmitted to them. According to this view, it would be expected that venous circulation would be much slower than arterial. This conclusion might indeed be arrived at from other considerations. Nature displays wisdom in the construction of all her works. Design is stamped upon all her creations. The greater capacity of the veins is essential to the preservation of life in many trying situations. During fainting the blood gradually leaves the arteries and accumulates in the veins; and whenever the vital energies are depressed the same effect takes place. This important modification in the distribution of the blood is imperatively necessary to the re-establishment of the powers of life. The left side of the heart and the arteries could not otherwise either begin to act or continue to carry on their feeble operations. In the case of fainting, the small quantities of blood sent into the aorta on the reviving contractions of the heart could not possibly urge forward the mass in advance of them and at rest; and in that of general depression the difficulties would only be slightly less in degree. The blood during the enfeebled or arrested action of the heart does not escape from one class of arteries only, but equally from arteries of the same calibre throughout the body. Situation does not materially influence the result. Whenever the heart ceases to contract, or its action is greatly enfeebled, the blood gradually leaves the arteries and accumulates in the veins. This effect takes place throughout the whole of the arterial system, in consequence of the interposition of capillaries between both classes of vessels. By their action blood is withdrawn from the one and transmitted to the other. Had not the veins a greater capacity than the arteries, the contents of the latter would clearly be retained. The pulmonary artery may perhaps be adduced as an exception to the operation of this law, being often found distended after death. This does not, however, arise from the want of capacity in the corresponding veins to receive its contents, but from the influence of peculiar circumstances. When the heart gradually ceases to contract, the arterial fluid in circulation becomes an exceedingly attenuated current, the veins and capillaries having already received the principal part. The surviving action of the latter vessels is in this case amply sufficient to absorb and convey forward the small quantity remaining after the cessation of the left ventricle. This cannot be expected to occur in the lungs. Blood cannot circulate freely from one ventricle to the other when these organs cease to be inflated, and consequently a portion of that sent out by the last feeble contractions of the right will necessarily accumulate in the pulmonary artery and its larger divisions. The capillaries cannot possibly remove it. Their surviving action, in the vicinity of the pulmonary veins, frequently leads to distension of the left auricle. We are aware that in maintaining several of these opinions, we stand almost alone. There is one authority, however, on our side, the justly acknowledged weight of which makes us comparatively easy in our solitary position. Bichat enforces the same doctrines. The following are his remarks on this subject.

" The tree in which the venous system terminates, compared with that in which the arterial system begins, is not quite the same.

The pulmonary artery and veins present a smaller disproportion of capacity, indeed, than in the other parts, but one which is actual and in favour of the latter. To explain how this is effected, it appears that since the one forms the continuation of the veins, and propels the same fluid, it ought to have the same proportion in diameter; and as the others are continuous with the arteries, they should in like manner be proportioned to them. This depends on the difference in the velocity of the blood. This fluid, indeed, moves more rapidly in the pulmonary artery than in the pulmonary veins, because the former is propelled by the impulse of the heart which the latter do not receive. In a given time, therefore, blood passes in as great abundance, though the diameter of the pulmonary artery is less; were it equal, indeed, the circulation could not be carried on. In like manner if the capacity of the aorta equalled that of the two *venae cavae* and the coronary veins united, granting the velocity of the motion of the blood to be the same, the circulation could not be accomplished."

"The four pulmonary veins taken together are a little larger than the aorta, which, nevertheless, transmits all the blood which it sends to them. The reason of this is, that the impulse communicated by the left ventricle sends in a given time more blood through the aorta than through the four pulmonary veins. These two circumstances, therefore, 1. velocity of the fluid; and, 2. capacity of the cavities in which it moves, are in an inverse ratio to each other, in the two opposite trees which form each vascular system. In the tree for red blood there is less velocity and greater capacity in the pulmonary capillary system to the impelling agent; of the latter, on the other hand, to the general capillary system there is a greater velocity and smaller capacity. In the vascular system with dark blood, there is less velocity, and greater capacity of the general capillary system to the impelling agent; of the latter, to the pulmonary capillary system there is greater velocity and less capacity. Without this twofold opposite disposition, it is evident that the circulation could not be accomplished."*

Magendie, in many parts of his writings, asserts unequivocally the dependence of pulmonary circulation on the contractions of the right ventricle. Indeed, he ridicules, in no very sober terms, the supposed co-operation of the capillaries.

"We have specified the modifications undergone by the animal fluid in its physical properties at the instant at which it traverses the lung. If it be asked what is the force which moves it in these tubes, the answer is, the pulmonary syringe. Every time it contracts, a new wave of blood is thrown into the arterial system, and by continuity of the tubes into the venous system. To this cause of impulse it is requisite to add the pressure exerted by the column of air, and by the respiratory powers on the organs, continued within the pectoral cavity. The peculiar action of the capillaries, the active contraction of their walls, are fancies to which no value can be attached, unless we wish to return to the golden age of vital properties."*

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* Anatomie Generale, Tome i. p. 350.

In another part of the same work, he exultingly exclaims,—We shall no longer seek an explanation in hypothetical suppositions, but in rigorous examination of the physical modifications which fluids and their canals undergo.

The zeal and talent of this distinguished physiologist we readily admit; at the same time, we are prepared to show that his mode of investigation, every step of which he regards as sure, has led to errors not less serious than those which he attributes to refined and elaborate reasoning. He has appealed in his inquiries directly to nature, but, we contend, with too little consideration and caution. His method has, in most instances, been much too direct and coarse for the complicated powers on which he has operated. His experiments to prove the transmission of the impulse of the right ventricle to the contents of the left auricle, will corroborate the justness of these strictures. They are thus minutely described by him.

" The feathers covering the anterior part of the chest of a goose were plucked; and in this manner the boundaries of the bones and the fleshy parts were easily distinguished. On each side of the breast bone, I make an incision parallel to the median line; and with the handle of the scalpel I scrape the bony surfaces to separate the muscular bundles. The breast bone denuded is next to be extracted. Usually I disarticulate the bone from the ribs; but to be more expeditious, I remove with strong scissors a large segment of its pectoral wall. The heart is found beating against the breast-bone; but when the osseous segment is removed, the pulsations cease, and the organ is agitated within its fibrous covering by a vibratory motion. By the alternate shock of its apex and its anterior surface against the chest, I explain the twofold cardiac sound. But this is not the place to discuss this question. We have only to examine the mode in which the blood moves in the pulmonary veins. For this purpose the breast-bone is entirely removed. The deep situation and the short course of these vessels render these researches very delicate. It is requisite to raise the heart, and to keep it for some time in this position, in order to isolate the veins. I fear, indeed, that we must suspend the experiment. The animal is agitated, and struggles violently. The heart contracts irregularly; and gives only occasional palpitations; a certain sign of immediate death. The animal, indeed, was lifeless."†

This experiment is repeated, and with the same result. The animal in both cases dies, nor can this be a matter of astonishment when it is considered how cruelly it is cut up and tortured. The experiment is again repeated on a rabbit, and with little better success. On puncturing one of the pulmonary veins, the jet of blood, in place of being synchronous with the contraction of the right ventricle, which he had previously calculated upon, is indeed synchronous with the contraction of the left auricle. After these several failures, he discovers, that the experiment is performed too near the left syringe to enable the observer to estimate separately the action of the right syringe. Hence it is evident these experiments afford no indication whatever of the influence of the right ventricle on the circulation of blood towards the left side of the heart, and yet the opinion is enforced with as much confidence as if founded on indisputable facts. Had the experiments succeeded according to the anticipation of this physiologist, they would not have furnished any accurate results. When the delicate and complicated functions of important organs are disturbed, as in this instance, it is impossible, amidst the confused phenomena presented, to distinguish between the natural and extraordinary. The character of the circulating currents may be entirely changed. The contractile properties of vessels or their modifying powers, may for the time be destroyed, and consequently the conditions induced may differ widely from those in the undisturbed state of the vital functions. The truth of this is indeed borne out by the last experiment. The jet from the punctured vein was synchronous with the contraction of the left auricle—a result not in any degree anticipated. The explanation of it will show, that the normal conditions of the pulmonary circulation were seriously deranged. The reflux of the blood in this case is unquestionably occasioned by the difficulty opposed to the passage of the fluid through the left side of the heart, and this cannot exist without causing distension in the series of vessels connecting the right ventricle and the left auricle. If the blood cannot readily escape from one end of the column, it will necessarily accumulate in all the intermediate points; and hence, the pulmonary vessels will clearly be in a condition unfavourable for the exercise of their contractile properties. Admitting that arteries contract upon their contents, this effect certainly cannot take place when they are in a state of complete distension. The regurgitation from the contraction of the left auricle is decisive, that obstacles exist to the flow of blood in this direction; and consequently the inference is unavoidable, that the series of vessels extending to the pulmonary artery are greatly distended. Magendie states, " that the contraction of the right ventricle is the cause that constantly keeps the elasticity of the sides of the artery in play; that is, which maintains them in a state of distension to such a degree, that, by virtue of their elasticity, they continually tend to contract and expel the blood."* In the experiments of this physiologist, this necessary degree of distension is greatly exceeded, so that, in fact, were the blood in the pulmonary veins observed to obey the impulse of the right ventricle, this would be no proof, as will be shown in a subsequent part of this inquiry, that their contents are directly influenced by it in the ordinary conditions of the circulation. He has in this, and likewise in many other experiments, reasoned upon the phenomena evolved, as if they were necessarily the same in all states of the vital powers; and to this unphilosophical method of interrogating nature, may be traced many of the false conclusions, both theoretical and practical, at which he has arrived. By the superior capacity of the pulmonary veins, nature has secured to the lungs every possible facility for the escape or transmission of blood. In objection to this, it may perhaps be stated, that, as the cavities of the left side of the heart are not proportionately larger than those of the right, the greater capacity of the four veins cannot act in the manner here supposed. The cavities of the heart do not, however, even in health, send out for two hours consecutively the same quantity of blood at each contraction. The quantity is modified by various circumstances, such as mental emotions, exercise, stimulants, sedatives, and almost every kind of *ingesta*; hence the cavities of the left side of the heart, having the power of accommodating themselves to a greater or less quantity of blood, may be regarded as having a capacity proportionate to that of the pulmonary veins, and consequently, when the necessity exists, capable of propelling a much greater quantity of blood in a series of contractions, than is sent into the lungs by a corresponding series of the right. The left ventricle is much more liable to a thickening of its parietes, accompanied with dilatation, than the right, arising from its frequently accelerated and vigorous contractions. In a paroxysm of spasmodic asthma, the lungs are loaded with blood and mucous secretions. Alleviation of the distressing symptoms can take place only on a diminution of the congestion. This, however, could never be effected, if the right side of the heart continued to furnish to the lungs as much blood as the left removed; for such equality would leave undiminished the undue quantity in these organs. This applies not only to spasmodic asthma, but to all cases of pulmonary congestion. In this condition, the right side of the heart has great difficulty in circulating the blood, as is evident from the prominence and pulsation of the jugular veins. The many interruptions to the flow of blood to and from the lungs would frequently cause death, were not the *venæ cavæ* and the lungs reservoirs, the former increasing their capacity to receive and retain, until the heart is able to transmit forward a portion, and the latter supplying the left cavities with blood, until the balance of circulation is established. Hence the quantity transmitted by the right side of the heart to the lungs is liable to be continually modified by the greater or less ease with which it permeates these organs. The capacity of the capillaries of the lungs united exceeding many times that of the pulmonary artery, the blood has every facility for flowing from the artery into the lungs. This is also aided by another circumstance; the expansion of these organs in inspiration; but how far this promotes, or is necessary to the passage of blood through the lungs, is a point much disputed by physiologists. Barry, as already remarked, contends, that the blood in the veins circulates only during inspiration; but it may be replied, that, as the contractions of the heart are about three times as frequent as the inspirations, the blood will necessarily flow into the lungs during expiration, and consequently circulate in the veins. This does not, however, prove that the single quantities of blood propelled by the successive contractions of the right ventricle pass freely to the left auricle during expiration. The lungs contain a much greater quantity of blood than what is transmitted to them by several contractions of the right ventricle. There are no data by which the amount can be ascertained. Were it known, some general idea might be formed of the rate at which blood circulates in the lungs. According to the experiment of Halcs, the velocity of the circulation in the lungs of a frog is five times greater than in the muscles. This fact, however, affords no inference respecting the difference in the rate of circulation in human lungs and other parts of the body. The organs of circulation and respiration are simple in the one animal, and extremely complex in the other, and consequently there will be a striking difference in the number and character of the causes in operation. Were the capacity of the pulmonary capillaries determined, or the quantity of blood which they contain, the rapidity of the circulation would be a problem comparatively easy of solution. It is on data of this kind that the rate at which blood moves in the aorta has been estimated, and probably with considerable accuracy. Such evidence is, however, altogether wanting in this case, nor is it possible to obtain it. The capillaries of the lungs united have undoubtedly a capacity many times greater than that of the pulmonary artery, and it is admitted that the rapidity with which blood moves in the arterial and venous systems is in the inverse ratio of their capacity. On this principle, how great will be the difference in the motion of blood in the pulmonary artery and the capillaries of the lungs, and if much slower in the latter, it will be easy to show that its motion in the corresponding veins will be slow and equable, compared with its course in the artery. The flow of blood from the right ventricle to the lungs is intermittent. The artery is too short to exert much influence upon it during the diastole of this cavity. The circulation from the capillaries to the left auricle is continuous. These minute vessels are constantly in action, and hence their contents pass into the pulmonary veins during both the dilatation and contraction of the left auricle. The dilatation of this cavity removes what had accumulated during its contraction. The capillaries are unceasingly urging forward the blood, but as this can escape only at certain regular periods, it will necessarily accumulate during the intervals. The blood in the *venæ cavæ* is placed precisely under similar circumstances, as will be fully shown in a subsequent part of this investigation. It is therefore evident that the condition of the circulating fluid in the pulmonary artery is very different from that in the pulmonary veins. In the one situation it is immediately acted upon by the impulse of the left ventricle; in the other, it is removed to the farthest possible point from this source of motion, and is separated from it by an infinite number of minute vessels, which exert an important influence on the currents transmitted to them. These are striking differences, and prove that the rate at which blood moves in the artery is greatly superior to that in the corresponding veins. It therefore necessarily follows that the united capacity of the latter is greater than that of the former. Equality of capacity would be accompanied by equality of motion. It is unphilosophical to imagine that the blood circulates in any vein at the same rate as in the artery from which it is immediately derived. A knowledge of the functions of both classes of vessels, and of their relations to the capillary system, is amply sufficient to refute such an opinion. The capillaries are not simply carriers of blood. They are the seat of all vital changes, and microscopical examination shows that their slender currents, so far from being distinguished by any uniform progressive motion, exhibit the greatest possible variety, nor are they immediately arrested by the cessation of the action of the heart. From these conditions, which universally belong to the capillary system, it would be inferred, that the veins into which these minute vessels pour their contents have a capacity much greater than the corresponding arteries which furnish them. The capillaries of the lungs have the same relations to the arteries and veins as those of every part of the body have to the same classes of vessels, and hence the inference is inevitable, that the pulmonary veins have a capacity superior to the corresponding artery. This divides and subdivides into innumerable branches, terminating ultimately in capillaries; and the vessels which carry the oxygenated blood to the left side of the heart gradually enlarge until they form the four capacious pulmonary veins. Hence the lungs may be regarded as composed of three classes of vessels—the pulmonary artery and its subdivisions, the four pulmonary veins, and the infinite intermediate capillaries. Each contains a large quantity of blood, the circulation of which will be differently influenced by the contractions of the right ventricle and the two acts of respiration. The blood sent to and removed from the lungs, in any four consecutive contractions of the two ventricles, in the time of one inspiration, certainly does not prove that blood passes uninterruptedly during expiration, from one side of the heart to the other. The portion of lungs nearest to the pulmonary artery is capable of containing several times the quantity transmitted by a single contraction of the right ventricle; and the portion nearest to the pulmonary veins possesses also sufficient blood to supply the left side of the heart, without that immediately propelled by the right. The contractions of the right ventricle transmit blood along the pulmonary artery and its principal divisions; but there is no evidence, nor is it probable that they urge it through the capillaries and larger vessels, terminating in the four pulmonary veins. When it is considered that the lungs are composed of minute vessels, exceeding all calculation in number, and possessing a contractile power, the blood in these veins can scarcely be imagined to be urged forward by the impulse of the right ventricle. Were this *vis-a-tergo* necessary, fatal accidents would frequently occur. In cases of severe congestion of the lungs, the blood circulating in the capillaries, the farthest removed from the right ventricle, cannot reasonably be imagined to be directly influenced by its contraction. The impulse exerted at this time is exceedingly slight; and the intermediate pulmonary tissue is not in a condition favourable for the transmission of it. A great part of the minute vessels contain blood at rest, or possessing little or no progressive motion; and how great must be the difficulties opposed to the transmission of the impulse, even in those in which circulation is feebly carried on, from a diminution in the stimulating qualities of the blood, and likewise from the congestion of the vessels. The capillaries unquestionably possess an impulsive force independent of the heart. The lungs, as already stated, are liable occasionally to excessive congestion, amounting in fact to many times the quantity of blood usually contained in them, the greater part of which is stagnant, and often remains so for a considerable period. Is the equable distribution of it subsequently affected by the heart, or by the capillaries excited to increased action by external or internal stimulants, or by their gradually improved condition? If the result be ascribed to the impulse of the heart, the opinion is fraught with insuperable difficulties. It is granting, that when the mass of blood to be moved is the greatest, it is nevertheless propelled into the veins by a force clearly inadequate to the effect. On this doctrine it must be admitted, either that the whole of the blood between the pulmonary artery and veins is so far influenced by the contractions of the right ventricle, as to furnish to the left auricle the retinuous. These minute vessels are constantly in action, and hence their contents pass into the pulmonary veins during both the dilatation and contraction of the left auricle. The dilatation of this cavity removes what had accumulated during its contraction. The capillaries are unceasingly urging forward the blood, but as this can escape only at certain regular periods, it will necessarily accumulate during the intervals. The blood in the *venæ cavæ* is placed precisely under similar circumstances, as will be fully shown in a subsequent part of this investigation. It is therefore evident that the condition of the circulating fluid in the pulmonary artery is very different from that in the pulmonary veins. 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On this doctrine it must be admitted, either that the whole of the blood between the pulmonary artery and veins is so far influenced by the contractions of the right ventricle, as to furnish to the left auricle the requisite quantity, or that a portion only in the intermediate capillaries is acted upon. Were the former inference correct, congestion would be of short duration, and indeed it is questionable whether it could possibly occur. What is understood by congestion is clearly the accumulation of blood, the greater part of which is stagnant. Now when the lungs are in this state, unaccompanied by acute inflammation, the contractions of the heart are feeble, and the pulse is usually small and weak, and, perhaps, scarcely felt at all. Is it to be imagined that the slender stream of blood received at this time by the left auricle is impelled by the contractions of the right ventricle? Admitting the fact, the conclusion to which it leads presents a most formidable difficulty. According to this doctrine, blood is never stagnant in the lungs, and, moreover, it is allowing, that when the mass to be moved is the greatest, and the propulsive power the weakest, it is nevertheless pushed forward in its course. This is certainly an impossibility. The left auricle is supplied with blood by the surviving contractions of a portion of the capillaries, which act when all other parts of the animal system have entirely ceased, and in ordinary cases of death it is found usually full of blood—a condition which cannot otherwise be satisfactorily explained. The last feeble contractions of the right ventricle will scarcely be regarded as adequate to the effect. Were they indeed the cause, the intermediate mass of capillaries would be expected to be more or less congested, to afford continuous columns for the transmission of the impulse, but this condition does not exist. The pulmonary tissue is exsanguineous and crepitous throughout. In cases of sudden death from hanging, drowning, or from any cause that immediately arrests the respiration, there is a striking difference in the quantity of blood at both sides of the heart—a difference which would indeed be calculated upon from the train of reasoning here pursued. The right auricle and ventricle, and the pulmonary artery, are mostly found greatly distended, whilst the pulmonary veins and the left cavities are only moderately so, and occasionally only to a slight extent. The cavities of the heart contract some minutes after the lungs have ceased to receive air. The blood transmitted by the right is soon arrested in its course towards the left cavities, and consequently accumulates in the former as well as in the pulmonary artery. This effect would be anticipated from a knowledge of the causes in operation. The pulmonary veins and the left cavities are very differently circumstanced during the gradual increase of the obstacles to the circulation; the left auricle and ventricle continue to contract, and thus prevent any great accumulation in them. When both sides of the heart have ceased, the surviving activity of the capillaries still facilitates the flow of blood into the pulmonary veins and the left auricle, producing a moderate degree of distension. This varies considerably in amount in cases of the same kind of death, depending, in fact, on the length of time the left cavities continue to contract. Were the impulse of the right ventricle transmitted throughout the pulmonary tissue, the condition of the lungs would be different from what has been described. The congestion would not be confined to the right side of the heart; the lungs generally would be affected. The blood, it is contended, permeates these organs from the direct impulse of the right ventricle, until arrested in its progress either by chemical or mechanical obstacles. The former is the prevailing doctrine. The obstacles, according to this view, ought to commence at the farthest point from the impelling power, and therefore the congestion should begin at the left side of the heart and extend to the right. The latter, however, is alone the seat of great accumulation. If the circulation be arrested from a deficiency in the stimulating qualities of the blood, which is explicitly stated by all modern writers, it ought unquestionably to be interrupted first in the capillaries the least under the influence of the right ventricle, which are of course those the farthest removed from it. It is a law of the animal system that congestion occurs most readily in vessels so circumstanced, and the case under consideration certainly forms no exception. Sudden death, arising from any of the causes specified, does not give rise to congestion of the lungs, and hence two important inferences may be deduced; first, that the obstruction to pulmonary circulation is not simply chemical, and secondly, that the action of the heart is not transmitted throughout the pulmonary tissue. To establish these points satisfactorily, we are aware additional evidence is required, and this will be presented when they come specially under our consideration. When asphyxia is the result of causes which act slowly, the lungs are always excessively engorged, and death is ultimately produced in consequence of it. In cases of this kind the obstacles to the capillary circulation are both chemical and mechanical.

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* Leçons sur les Phenomenes, &c. Tome ii. p. 266.

† Ibid. p. 272.

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* An Elementary Compendium of Physiology. Fourth edition, page 372, Translated by E. Milligan, M. D.

To return, however, to thesubject under investigation, viz. the influence of the heart on the motion of blood in the minute vessels of the lungs, it will scarcely be argued that at this time, the slender streamlets are urged, into the left cavities by this power. It is indeed unequal to the effect. If a portion only of the capillaries be acted upon, a quantity of blood is acknowledged to be at rest. How is this subsequently put in motion in cases of recovery? Certainly by the improved condition of the capillaries. The heart neither causes nor removes partial accumulations. On the resuscitation of life, the occasional expansion of the chest allows the small quantities of blood received to flow along, until they reach the capillaries on the side of the lungs nearest the left auricle; these being stimulated, carry forward their contents, communicating a slight motion to the blood in the pulmonary veins, the undue distension of which is gradually relieved by the feeble contractions of the left ventricle.

Sir David Barry endeavours to illustrate the influence of inspiration on the motion of blood in the veins, by a diagram which, from its supposed accurate representation of important organs and functions in the animal system, is considered to demonstrate the fact. It will, however, on close examination, be found destitute of the conditions essential to a correct illustration of the phenomena. That the blood flows into the heart, as well as into the lungs, in the interval of two inspirations, will not be questioned, but in the instrument, the mercury or fluid employed, is said to rise only to the globe E, at times corresponding with the vacuum made in it, so that in the interval of two vacuums the fluid is at rest.

"It is manifest that the fluid contained in the flexible tube cannot rise in E unless at the moment when the reservoir is distended in order to form a vacuum, and that at the moment when the tendency to the vacuum ceases the fluid will obey the laws of gravitation, and will distend the lower parts of the tube."

"It is easy also to conceive that the motions of the fluid in the branch A will be directly in proportion to the injecting force, as the motions of the fluid in the branch B will be in proportion to the expansion of the reservoir E; and that a reciprocal influence will be exerted on each side, by reason of the communication of the two branches at C, either by one single canal or by several canals." *

This is clearly not the condition of the blood in the interval of two inspirations. Its transmission into the right auricle does not depend upon, nor is it regulated by, the alternate expansion of the lungs. For this argument to possess the least force, the auricle should be supplied at times corresponding only with inspiration. The instrument which he imagines to illustrate his peculiar views, has led him into serious errors, as may be shown by an analysis of the following remarks.

"As to the accumulation which ought to be prepared by the aspiring action of the chest, it is of little consequence whether it is effected by two or by six pulsations; and consequently the frequency of the pulse cannot be taken as the standard of the velocity of the blood returning to the heart. This velocity is regulated by the repetition of the inspirations."

"There are, therefore, three quantities of blood; one which passes through the aorta; one which is aspired by the veins; and a third which is between these two orders of vessels. When respiration is accelerated, this third quantity is diminished, and the two others proportionally increased; but as the heart can receive only a

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* Recherches experimentales sur les causes du mouvement du sang dans les veines. Par David Barry, M.D. p. 46.

certain quantity of it, the aspiring cavities are obliged to repel the surplus during their collapse; hence result pathological phenomena, into the description of which I shall not at present enter."*

In the instrument which he describes, it is evident that the motion of the fluid in the tube connected with the globe will not only depend on the vacuum which is made in the latter, but may indeed be measured by the frequency and completeness with which this takes place.† The fluid can escape only at this time. In the animal system the blood flows, however, into the right auricle, not at times corresponding with the dilatation of the chest, but even during its contraction. Here then is a striking difference between the instrument and the vital functions with which it is compared. It is stated that the velocity of the blood returning to the heart cannot be measured by the frequency of the pulse, being in fact regulated by the amount of inspirations. In this remark there is a small portion of truth, but a much larger share of error, the exposition of which leads to some interesting physiological inquiries. One condition of the pulse certainly affords no positive information respecting the rate of venous circulation, viz. a pulse weak and small, whether slow or frequent; but his objection is directed not against any particular kind of pulse, but against this generally as a measure of the velocity of venous circulation—a conclusion decidedly fallacious. Nor does the number of inspirations afford any better data for determining the question. The time required for the circulation of the whole mass of the blood through any given point of the system depends on two circumstances; the number, and the greater or less fulness of the contractions of the heart. If the blood be propelled by the left ventricle in a strong and bounding stream, the venous current will necessarily partake of the same character, and hence the rate at which the latter moves may be correctly inferred from the conditions of the former. The case in which the contractions of the heart appear to furnish no satisfactory information or data is when they are small and frequent. At this time the venous circulation is exceedingly slow, and yet the arterial is accelerated. Supposing this fact to be established, the frequency of the pulse under such circumstances is clearly no indication of the rate at which blood moves in the veins. The phenomenon is not difficult of explanation. When the powers of the animal system are greatly exhausted or depressed, there is a marked change not only in the qualities, but in the distribution of the blood. This leaves the extremities and surface of the body, and accumulates in the internal organs, especially in the liver, spleen, and the great veins. As this change proceeds, the contents of the arteries gradually diminish, until at length the pulse becomes excessively small, feeble, and usually frequent. The quantity of blood at this time in actual circulation is small, perhaps not above one-third or fourth what is ordinarily in motion. There is clearly then an extraordinary disproportion between the contents of the arteries and veins. While the former are nearly empty, the latter are immensely distended. As the rate of motion in each class of vessels will be in the inverse ratio of the amount of their contents, the venous current will manifestly be extremely slow, while the arterial is quick, estimating its rapidity by the frequent contractions of the heart.

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* Opus cit. p. 38.

† [The author quotes here as a note the Supplement to the Experimental Researches to the late Sir David Barry, published in 1826, and reviewed in the 27th Volume of this Journal. As this Supplement is found at p. 41 and the ten subsequent pages of the work of Sir David Barry, it is unnecessary to reprint it here. Vide Experimental Researches on the Influence of Atmospheric Pressure upon the Blood in the Veins, &c. London, 1826.—Ed.]

A knowledge of these conditions of the circulatory system will enable the mind to form a pretty correct judgment of the rate at which blood moves in the veins, and consequently, the pulse may be regarded, even at this time, a measure of the velocity with which the blood returns to the heart, or, in other words, it affords data for such calculation. Barry asserts that the fact can be determined only by the number of inspirations. Were these to be our guide, they would certainly lead to conclusions as fallacious as the frequency of the pulse, considered independently of its other conditions. In those states of the animal system to which we have adverted, in connection with the small and frequent pulse the breathing is invariably quick. Were the number of inspirations, therefore, a measure of the velocity of venous circulation, this would be greatly accelerated, which is not the case. Whenever the powers of life are suddenly exhausted or depressed, the inspirations are always frequent, and yet there is the clearest evidence that the venous blood is moving slowly. Its accumulation in the veins, and the comparative emptiness of the arteries, establish the fact. The frequency of inspiration, without a correct apprehension of other conditions, to which Barry makes no allusion, clearly does not afford any measure of the velocity of venous circulation. Viewed alone it is of the same value as the mere frequency of the pulse. The instrument described by Barry cannot, therefore, be regarded as conveying a correct idea of the influence of the thoracic organs on the motion of blood circulating against gravity. Poiseuille states he has proved, by direct experiments, that blood passes through the lungs when each side of the chest is freely opened, respiration being maintained artificially, and continues to circulate for at least an hour after the cessation of inflation. These experiments do not, however, authorize the inference which appears to flow from them, viz. that the expansion of the lungs is not at all essential to the passage of blood through them. They are too defective in several important respects to warrant this conclusion. Inspiration accelerates the motion of blood, only in so far as it diminishes impediments to its transmission from the right to the left cavities of the heart. The blood in the lungs and that in the *venæ cavæ* are so differently circumstanced, that either act of respiration will scarcely be imagined to affect both in the same manner. The striking dissimilarity in their conditions has not been sufficiently taken into account, as is evident from the experiments of Barry, and of others engaged in the same train of inquiry. Inspiration occurring simultaneously with the dilatation of the right auricle will facilitate the flow of blood in the *venæ cavæ*, but to a very slight extent at any other time in ordinary breathing. It may perhaps be objected, that the capacity of the auricle cannot justly be regarded as the measure or regulator of its influence,—the space at the termination of these vessels admitting of great enlargement, which will also give the blood a tendency to move in that direction, at the same moment that it flows into the auricle. Hence the capacity of the auricle, and the degree of enlargement of which that space is susceptible, might conjointly be regarded as the causes limiting the influence of inspiration. Were blood, however, transmitted at every successive expansion of the lungs to the latter, this space would soon become so occupied as not to allow of further increase. The constant circulation of blood, and the determination of a quantity at each inspiration to the roots of these vessels, would indeed quickly prevent any further accumulation.

Were the effect questionable in the ordinary conditions of the system, it would be inevitable when these became excited or disturbed, and especially during the cruel tortures of experiments. The blood does not circulate against gravity in the *vena cava descendens*, and consequently will flow towards the heart, without the aid of the suction power of the chest. In the experiments of Barry, the blood in the *vena cava ascendens* was also necessarily in motion, from the great muscular efforts made by the animal. Admitting this, and the absorbing agency of inspiration, great accumulation, as just remarked, would unquestionably take place at the right side of the heart, and would arrest at once the farther agency of inspiration. There is no continuous connection between the blood in the *venæ cavæ* and that in the lungs. Were it in the two situations united by an uninterrupted stream, a modification in the one would immediately be communicated to the other, but clearly not otherwise. When the right auricle contracts, a barrier is of course placed between the blood sent out and that which flows in with the succeeding dilatation, but the blood received transmits no motion to that in the lungs. There are about three dilatations of the auricle, causing the blood to move in the veins, to one inspiration, and hence inspiration, as a moving power of the blood in these vessels, must be extremely slight. Poiseulle proved, by the most decisive experiments, that inspiration has no effect whatever on the motion of blood in veins, a short distance from the chest, and in corroboration of this fact, it is well known, that on puncturing them, blood flows freely, though its passage to the heart be interrupted by ligature. The experiments of Barry were ingenious and well-conducted, but, from the unnatural and forced position in which the animal was placed, and the very great disturbance unavoidably produced in important functions, the operation of which it was the object of these experiments to determine, render the conclusions drawn from them liable to serious objections. The horse was mostly the subject of experiment. It was thrown upon the ground, and of course held down against the violent efforts which it would occasionally make to rise. The respiration would become extremely huried, and the circulation necessarily equally excited or disturbed. It was under these circumstances that the coloured fluid in the spiral glass tube introduced into the large veins, was observed to ascend towards the chest on inspiration. The manner in which these experiments was performed might possibly produce a relation between the blood in the lungs, and that in the great veins, which does not naturally exist, and hence evolve phenomena which cannot be regarded as demonstrative of what occurs in the ordinary actions of the animal system. We have just remarked, that the blood in the *venæ cavæ* has no continuous connection with that in the lungs, and therefore how greatly soever its motion may, in the latter, be accelerated by inspiration, the circulation in the veins will not be at all directly affected by such motion. When an animal is tortured, as the horse was on these occasions, it is not improbable the right auricle and ventricle may be so excited and agitated, that the dilatation of the former may take place when the tricuspid valves are only imperfectly closed by the contraction of the ventricle, and thus a partially uninterrupted current will connect the lungs and the *venæ cavæ*. Were this the case, the strong inspirations of the animal would unquestionably draw the blood forcibly from the veins, or the coloured fluid in the spiral tube in connection with them towards the chest, there being indeed no obstacle opposed to the exercise of this influence. This change in the natural action of the heart would produce the result here stated, and the probability of its occurrence is strengthened by the fact, that when the experiments were made upon the animal standing, the effect of inspiration was scarcely at all perceived.

" When the animal was on his legs, atmospheric pressure was never so strongly marked as when he was thrown down. Of this I convinced myself by repeating the experiment on the same animal in both positions; when I saw that the coincidence of the motions of the liquid with respiration could scarcely be observed in the first position, because the respiration of the horse on his legs and at rest is almost imperceptible."*

The explanation of the different effects in the two positions of the animal is certainly in part, but not wholly, correct. Admitting the truth of it, what will be the condition of these veins immediately at their termination, after two or three violent inspirations? If blood flow abundantly to them from the diminution of pressure, will not considerable accumulation be the inevitable result, and hence, the further agency of inspiration be at once arrested? It will scarcely be argued, that the accelerated contractions of the heart will prevent the effect; for though strong and frequent there is great difficulty opposed to the passage of blood through the lungs, in consequence of the disturbed breathing and constrained position of the animal. That they do not is evident from the swollen and pulsating jugular veins. In endeavouring to estimate the influence of inspiration, Barry evidently did not consider, how greatly this is liable to be modified by the situation of the coloured fluid employed in his experiments. In proof of this, it may be mentioned, that the spiral tube, which had previously been placed in the veins to exhibit the influence of inspiration, was subsequently introduced into the pericardium, and the result observed is adduced to illustrate and strengthen the same fact. How differently, however, is the fluid circumstanced in the two situations. From what has been already stated of the relation which the blood in the *venæ cavæ* bears to that in the lungs, it is clear that the introduction of a tube into the pericardium cannot be regarded as exemplifying the agency of inspiration on venous circulation. The greatest possible difference exists in the two cases. The pericardium and the *venæ cavæ* have not the same relation to the heart. The coloured fluid in the spiral tube introduced into the former will certainly enter with more or less facility, according to the pressure made upon the sac; but the effect, whether great or only just perceptible, is no evidence of the influence of inspiration on venous circulation. To compare phenomena occurring in such dissimilar circumstances, shows how little the relations between different parts of the circulatory system have been studied. We shall now pass to the examination of the influence of respiration on the motion of blood in the lungs. That the expansion of these organs, whether natural or artificially produced, is essential to the free transmission of blood through them, will scarcely admit of doubt. There is indeed great difficulty in determining how it affects the circulating fluid. Does it give to the blood propelled by the right ventricle additional velocity, from exerting an absorbing or suction power, or does it only remove obstacles to its flow into the minute capillaries, which transmit it forward? If the circulation of blood in the lungs depended on their absorbing power, it would clearly be arrested on the cessation of this action. Poiseuille has shown, indeed, that when two incisions are freely made into the chest, securing by artificial means their occasional expansion, circulation for some time is nevertheless maintained. It is stated for at least an hour after the discontinuance of inflation. These are his words.

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* Opus cit. p. 20.

> "A tube is fixed in the windpipe of a dog; and while the two sides of the chest are extensively opened in a direction parallel to the breast-bone, artificial respiration is maintained by means of bellows. As soon as the chest is opened the auricles enter its cavity, and the lung is depressed on each side of the spine, in consequence of its elasticity; air is forced into the lung; its cells are dilated, and at length the whole organ, in consequence of the pressure of the impelled air. When the blowing is given up, the lung collapses again by its elasticity; the air which it contains has still a degree of pressure superior to that of the atmosphere. In this experiment, which is not new, the air contained in the lung has always a greater pressure than that of the atmosphere; the venous blood is not more aspired, and nevertheless the circulation continues, so that the animal lives for one hour at least, after which the inflation was stopped."*

This experiment certainly does not afford results on which we can safely reason. It is scarcely possible in the whole range of experimental physiology to adduce an instance in which the important functions of life are more violently disturbed than on this occasion. No organ retains its natural conditions. The trachea is divided in order to receive a tube, two large incisions are made into the chest, and then respiration is carried on artificially. The nice adjustments of the animal system cannot exist under such circumstances, nor can any positive inference be drawn with respect to the influence of any function. No tact or analysis, how refined soever, can obviate the difficulties. Truth and order cannot be evolved out of such general derangement. It is stated that pulmonary circulation continued not only during this state of things, but even after the cessation of inflation, and indeed when the lungs had ceased to act. In evidence of this we are told that the animal lived an hour. If the functions of life were carried on so admirably, why did it die so soon? The animal could not possibly have lived this length of time unless the lungs had received air, and though the quantity might be small, nevertheless sufficient to aerate the feeble currents in motion. Had the blood flowed in quantity and force through these organs, as in health, or in any degree approximating to it, there would then have been just grounds for the inference which Poiseuille has deduced. The experiment cannot be performed without producing an important result, to which allusion has not been made, viz. congestion of the lungs. This condition invariably follows the division of the trachea, and especially when respiration is attempted to be carried on artificially. Every such interference with this cardinal function of the animal economy has in all our experiments been characterized by this effect. It is this circumstance which prevents the elasticity of the lungs from acting as in health, and it is impossible that a vigorous state of the pulmonary circulation can coexist with it.

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* Journal de Physiologie Experimentale et Pathologique, par F. Magendie. Tome x. An. 1830, p. 290.

It is stated that these organs, after the cessation of inflation, are still, from the air which they contain, superior to the pressure of the atmosphere. It is not, however, the small quantity of air within the lungs which prevents their complete collapse, and secures, as it is imagined, the continuance of pulmonary circulation. This is indeed a misconception. The cause which counteracts the external pressure is the existing congestion, but this is not regarded as facilitating circulation. It is certainly under such circumstances more favourable for its continuance, than the complete collapse of these organs. From the abundance of blood thus accumulated, there is necessarily a trickling from various channels in the direction of the left cavities of the heart, and life ceases only when these small streamlets are arrested. If this explanation be correct, the experiment is evidently of no value in the present investigation. If it prove anything it proves a great deal too much. When the lungs are inflated by inspiration, the pulmonary artery and its numerous subdivisions are in a condition favourable for the reception and transmission of blood, but in the succeeding expiration they are compressed, and partial congestion is produced in that portion of the lungs directly connected with them. This appears to be proved by several phenomena. When the mind is strongly interested in the relation of a story, or by any powerful appeal to its feelings, the two acts of respiration are not performed in their regular or quick succession, but, on the contrary, a sigh or deep inspiration is made at long intervals. This arises from the accumulation of blood in the vessels, and in that portion of the lungs nearest to the right side of the heart. The prolonged inspiration is proportionate to the extent of the congestion, which it is necessary to remove. In all diseases of the pulmonary organs in which this condition exists, the breathing is short and frequent, and at times characterized by deep inspirations. Greater the congestion, or less able the lungs are to receive and aerate the blood, and the more frequent is respiration. The capillary vessels of the lungs cannot, as under ordinary circumstances, circulate the several quantities propelled by the contractions of the right ventricle, unless the inspirations be accelerated to relieve the congestion on the side of the lungs nearest the right ventricle. This is often only partially effected, as is evident from the pulsation of the jugular veins, which occurs when difficulties to the transmission of blood through the lungs exist; whether from recent congestion, tubercular disease, or from any other cause. Violent exercise, as running for example, changes the natural character of respiration. During the almost suspended breathing at the beginning of the exercise, the flow of blood through the lungs is very much impeded. On its cessation, the inspirations are greatly accelerated, in order to facilitate the transmission of the several quantities of blood previously sent out by the right ventricle. The balance of circulation would be restored were the exercise long persevered in, as is strikingly exemplified in persons practised in running. At first they are distressed, breathing with difficulty; but so far from this increasing, the respiration after a time gradually becomes less laborious, they having arrived at what is commonly called the second breath. The hurried respiration arises principally from the cause assigned, more blood being conveyed by the right, than is removed by the left ventricle. The latter, however, is soon vigorously roused, and removes in a series of contractions a greater quantity of blood than is sent to the lungs by the corresponding contractions of the right ventricle, so that the balance of circulation previously broken, is again re-established, and continues from the equally excited action of both sides of the heart.

Bourdon, who has deeply studied this subject, offers the subjoined explanation, which is partly corroborative of the foregoing remarks.

" The compression undergone by the lungs is felt upon the vessels with red blood, as well as on those conveying dark-coloured blood; upon the small roots of the pulmonary veins, as well as on the divisions of the pulmonary artery. The result of this compression of the red blooded vessels of the lungs is the following. At first the more blood flowing to the left chambers of the heart and of the arteries, diminishes in proportion as that of the right chambers and of the veins augments. This is proved by the following facts. 1. Often in feeling the pulse of persons labouring under hooping-cough, asthma, or even pulmonary catarrh, whenever violent fits of coughing came on, I felt more strength and more frequency in the pulsation of the artery; and the face was at the same time more flushed. If the fit continued, the pulse became small, irregular, and scarcely perceptible, and the face violet-coloured. Lastly, when the fit diminished and ceased, the pulse recovered its frequency and strength, and the face its usual colour. Similar observations I made in great efforts of parturition and of vomiting. In all these cases, the disturbance induced in the beatings of the arteries, always coincided with the changes in the colour of the face; and necessarily so, because these two phenomena proceed from the same compression of the lungs."*

The smallness and irregularity of the pulse on the long continuance of cough, in the diseases which he mentions, do not prove, that the blood at the left side of the heart diminishes in proportion as that at the right increases, or that these peculiarities of circulation arise from deficiency of blood at the left side of the heart. The pulse is almost invariably small and feeble, and generally frequent in congestion of the lungs, unaccompanied by acute inflammation, and, so far from these phenomena being attributable to too little, they are mostly the effects of too much blood. The undue quantity determined to the chest does not undergo its ordinary chemical changes, in consequence of which it is incapable of exciting strongly the left side of the heart. We are aware that this view respecting the influence of expiration is not generally entertained by physiologists. Experiments cannot, in this case, be appealed too, in order to determine the question, and consequently, the opinion which may be formed does not rest on clear and unexceptionable data. The phenomena adduced by writers in support of their views are by no means satisfactory. In the following extract Haller states, that "in expiration the blood is conveyed to the compressed lungs with greater difficulty; the right side of the heart empties itself less easily; the blood stagnates in the *venæ cavæ*, in the jugular vein, in short, in the whole brain; and consequently, the sinuses and jugular veins swell, because they continue to receive blood from the small vessels, while they are unable to empty themselves.

"To the cause now mentioned is added another, which I learned by experiments,† but which Francis Lamure‡ has more elegantly employed to explain the phenomenon. It is this. In expiration, the chest is contracted, the lungs, auricles, and *venæ cavæ*, are compressed; the blood regurgitates into the veins of the brain, which, therefore, with the whole brain at the same time, swell during expectoration. Hence in compressing the chest,§ as I did, and obstructing the *vena cava*,|| the brain is equally elevated.

"Long ago, J. Adrian Slevogt,¶ observed the sinuses of the brain become distended on coughing; and other eminent men saw the blood determined to the head by emetic medicines,** which cause violent expiration. But these facts, Francis Lamure has more fully illustrated by experiments,†† and my own experiments leave no doubt that he has disclosed the true cause of the phe-

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* Recherches sur le Mechanisme de la Respiration, et sur la Circulation du Sang, Par Isid. Bourdon, page 70.

† Second Mem. Sur les part. Sens et Irrit. Exp. 78.

‡ Pp. 547, 558, 559, 562, &c.

§ P. 548.

|| Pp. 551, 552.

¶ In disp. de Dura Mater.

** G. v. Swieten Comment. T. iii. p. 266.

†† Second Mem. Exp. 116, 117.

nomenon. These circumstances seem to be more fully distinguished by Bordeu, in so far as he states that the arterial pulse refluent from the arm is associated with inspiration, and the wave, as it were expelled, is connected with coughing or inspiration."*

The phenomena which are here stated as evidence that the blood circulates through the lungs during inspiration only, will not, on careful examination, be found to establish the fact. It is at once admitted, that the blood enters these organs with difficulty, after several violent expirations; but there is a marked difference between the obstacles opposed to its entrance, and the condition of that already in motion towards the left side of the heart. Obvious and important as this distinction must appear, it is one that has not been clearly perceived. The phenomena stated by Haller, prove that the blood enters the lungs with difficulty, during a series of expirations, but do not afford any conclusive argument respecting that portion in circulation towards the left auricle. The subsidence of the lungs cannot possibly influence, in the same manner, the blood which enters and that which leaves these organs, and yet an influence, the same in degree and kind, is often contended for, or implied in the arguments advanced. It is not to be supposed that the capillary circulation of the lungs is arrested by expiration. The pressure is too partial to produce this effect. An obstacle is certainly opposed to the free transmission of blood along the pulmonary artery and its immediate subdivisions, and consequently, after an uninterrupted series of expirations, the blood must necessarily meet with considerable difficulty in its passage from the right ventricle. Congestion will take place on the side of the lungs nearest this cavity, the blood not being able to escape either by a retrograde or progressive motion. How differently is it circumstanced on the left side of the heart! Pressure in this case will urge forward the blood, and especially during the dilatation of the left auricle, which in ordinary breathing occurs about three times to one expiration. There are other opinions respecting the influence of expiration which appear exceedingly questionable. Burdach states, that the aortic system receives less blood during inspiration than expiration.

The following are his words.

" The aortic system receives blood during inspiration, and more during expiration. Poiseuille † found the arterial current diminished in the first case, and increased in the second. When Bichat opened the carotid of an animal, and the latter cried or made a great expiration, the blood spurted out with greater force. When Bordeu respired by the mouth in epistaxis, he discharged in the course of thirty seconds, from ten to twelve drops of blood during inspiration, and from fifteen to sixteen during expiration. A prolonged inspiration stopped the hemorrhagy. Hemorrhagies which have ceased after amputation return after the patient coughs; and aneurisms sometimes burst during a strong expiration. I cannot affect the smallest change in my pulse by the longest expiration; but it disappears completely when I make a protracted inspiration."*

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* Du Pouls, p. 324. Elementa Physiologiæ, Tomus secundus, page 335.

† Repertoire General d'Anatomie, T. vi. p. 70.

Before proceeding to examine the truth of this doctrine, it may be well to give the words of Bichat, to avoid the possibility of misconception.

" Further, the influence of great expirations in the force with which the blood is projected from the heart is very obvious, without touching the windpipe. Open the carotid artery; hurry the breathing by putting the animal to suffering, as all sudden pain at once induces this change in the action of the diaphragm and intercostal muscles, and the jet of blood is manifestly increased. This increase even may be produced artificially by compressing forcibly and suddenly the walls of the chest. These experiments succeed especially in animals already weakened by loss of blood. Without this they are less apparent."

" The reason why in the ordinary state great expirations made voluntarily do not render the pulse stronger, while in experiments they often increase the jet of blood, is to me unknown."†

The doctrine which is here taught and generally received by writers, may certainly be shown to be erroneous, and the fact which Bichat acknowledges his inability to explain will, on a little consideration, be found to present no difficulty. Expiration can exert no direct influence on the quantity of blood sent into the aorta. The immediate changes produced by it in the condition of the circulation, in the lungs, cannot in any degree affect the amount of fluid transmitted by the contractions of the left ventricle. Admitting that it increases the flow of blood towards the left cavities of the heart, the auricle, if dilating at the same instant of time, clearly receives the quantity so determined, and the next moment, when the ventricle dilates, and subsequently contracts to convey this into the aortic system, expiration, even if it take place simultaneously with the latter action, can manifestly have no direct agency on the strength of the current expelled. As the dilatations of the ventricle are in the proportion of at least three to one expiration, this will be as likely to occur when the ventricle is dilating as contracting, and if during its dilatation, it will surely not be argued, that the arterial system receives at this time a strong current of blood, when indeed none is transmitted. But even supposing expiration and the contraction of the cavity to take place at the same instant, these two powers are evidently not acting on the same column of blood. The one is sending fluid, either into the left auricle or in the direction of it, the other into the aorta. The phenomena adduced by physiologists in support of the doctrine which is here combated may be readily explained on other principles. The effect produced by expiration on the arterial current is entirely attributable to the contraction of various important muscles. The number, character, and force with which they are brought into play depends of course on the degree of bodily exertion excited. If great, the arterial current will be projected with violence; and if slight, with a proportionate diminution of strength. On this view there is no difficulty in accounting for the phenomenon which is regarded by Bichat as inexplicable, viz. why great expirations do not render the pulse stronger, yet in experiments increase the jet of blood.

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* Traite de Physiologie, Tome vii. p. 48. Paris, 1837.

† Anatomie Generale, Tome i. p. 157.

The pulse depends on the contraction of the left ventricle, and the accelerated flow of the arterial blood in his experiments, on the pressure which is made on the arteries. The two causes have not the slightest connection. It is, therefore, manifest, that, according to this view, it is an impossibility for strong voluntary expiration to give rise to the same obvious results as are observed in experiments on divided or bleeding arteries. Unless the blood can escape from the pressure, there are no means of testing the influence of expiration. This cannot, as already stated, either accelerate or strengthen directly the pulse, its varying conditions depending on corresponding changes in the contractions of the left ventricle. It is also the prevailing opinion that less blood enters the lungs during expiration than during inspiration. The facts in support of this doctrine are imagined to be numerous and irrefragable, and no one has ever presumed to question its accuracy. The following extract from Burdach states distinctly and briefly the phenomena which are regarded as placing the matter beyond all doubt.

" During expiration less blood enters the lungs; and the *venae cavæ* are the seat of swelling, which is continued more or less into their branches. A moderate expiration is sufficient to show the jugular veins swelling in lean persons; in those who cry, laugh, or cough forcibly, the swelling extends to all the veins of the head, and even partly to those of the rest of the body. Bourdon* saw it in animals extend to the crural and mesenteric veins; and he noticed† the *venæ cavæ* swell in dogs while barking. The excessive fulness of the system of the *vena cava* depends on the fact that less is emptied into the lungs, part of the blood returning thither from the right side of the heart. Haller‡ saw this liquid recede during expiration in the superior cava to the neck, and in the inferior cava to the liver. Cotugno§ states also, that he observed in the venous sinuses of the brain, pulsations isochronous with those of the arteries; and he thinks that the pulmonary auricle distended with blood during expiration repels the tubercle of Lower, (§. 708–40,) into the right auricle, so that the blood of the superior cava is compelled to regurgitate towards the head, while that of the lower *cava* is more freely poured into the heart."*

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* Sur la Respiration et la Circulation, p. 68. † Ibid. p. 65.

‡ Loc. cit. p. 137, 141, 203.

§ Giornale per servire alla storia della Medicina, T. vii. p. 176.

We shall attempt to show that the phenomena here stated do not establish the fact contended for. It is necessary to make a distinction between the effects of ordinary, and a continued series of extraordinary expirations. A difference in their degree makes them perfectly distinct causes in operation. The quantity of blood which enters the lungs, is not in any way modified in ordinary breathing by expiration. This has in fact as little influence upon it, as upon the quantity of blood propelled by the left ventricle. The same kind of reasoning applies to both cases, and with equal force.

Indeed the cases are perfectly analogous, with this difference, that in the one, the pressure is made upon arteries, and in the other upon veins. No continuous connection existing between the column of blood in the *vena cava* and that flowing into the pulmonary artery, a modification in the former column cannot possibly influence the amount sent out by the right ventricle. Were the relation between the two continuous, this effect might take place, but not otherwise. The retrograde motion of blood occasionally observed in the *vena cava* during expiration is no evidence of any deficiency of fluid at the right ventricle, nor of the existence of any impediments to its passage through the lungs, though certainly it is most apparent when such are present. The phenomenon frequently occurs when it clearly cannot be attributed to this cause. In thin and delicate individuals, one or two expirations, as in coughing, will often be seen to produce it, in which case it cannot be ascribed to the compression of the lungs preventing the ingress of blood. The contents of the right ventricle are not so immediately arrested in their course, and hence the auricle has no difficulty in relieving itself. It has, however, during a lengthened series of strong expirations. The regurgitation is often regarded as indicating the existence of impediments either in the heart or lungs, when it may be shown to originate in the altered condition of the great veins. In delicate and debilitated constitutions, a greater proportion than natural of the vital fluid accumulates in the venous system, causing considerable distension of the veins near the heart, extending occasionally to the jugulars. This condition rarely exists without being accompanied by pulsation in the latter. This is not occasioned by any difficulty experienced by the auricle in transmitting forward its contents, but conjointly by two causes, the contraction of the chest and that of the auricle. The effect is rendered manifest in consequence of the large column of blood extending from the heart to the point where it becomes apparent. To diminish the column, without in any degree modifying the condition of the lungs, would be to prevent the manifestation of the effect. The influence of inspiration on pulmonary circulation is limited, in our view, to the removal of impediments to the passage of blood through the lungs, and, therefore, it is not a matter of surprise, that it was not arrested in the experiments of Poiseuille, in which artificial inflation was employed, nor is its continuance difficult of explanation, as we have shown when inflation had been interrupted for an hour. The feeble circulation carried on at this time can in no degree elucidate the ordinary effect of inspiration. Voluntary and deep inspirations corroborate the views which are here proposed explanatory of their natural operation. When forced and frequent, in place of being in the ratio of one to about three dilatations of the right auricle and ventricle, they occur perhaps simultaneously with the latter. This will, of course, facilitate the flow of blood into the auricle, and also its passage from the ventricle into the lungs, but not equally its transmission through them. Pulmonary congestion is the consequence, if such inspirations be continued for only a very short period. In trials upon myself, acute pain was caused in the chest; the pulse was accelerated, but diminished in strength. In what manner shall we explain, however, on these views, the possibility of persons remaining under water a considerable time, say almost half a minute, without any injurious effects? What would be the condition of the sanguiferous system, agreeably to the doctrine that blood circulates only in the veins during inspiration? The motion of blood in these vessels would be arrested, and the larger arteries would be almost emptied, receiving scarcely any supply from the lungs. These results would be incompatible with the safety or well-being of life. The objection is not equally strong against the doctrine advocated in these pages. Before diving, the chest is distended by a full inspiration, and as the breath is held, it remains in this state, and hence the blood is enabled to enter and pass through the lungs sufficiently freely to prevent any serious derangement of the vital powers. This view is amply borne out by experiments which were performed by Bichat to determine the difference in the colour of the blood, on arresting the breathing after an inspiration and expiration. The arterial fluid presented its natural appearance much longer after the former than the latter, which fact may be adduced to prove, that pulmonary circulation was much longer maintained after the one act than the other. The experiment establishes both conclusions equally satisfactorily.

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* Opus cit. Tome vii. l. 46.

Art. XII.—*Cases in Legal Medicine, with Remarks.* By D. Skae, Esq. F. R. C. S. and Lecturer on Forensic Medicine.

I. *Case of Suffocation during a state of Intoxication.*—The following case, interesting in many respects, is particularly so in relation to medico-legal inquiries regarding sudden death occurring in suspicious circumstances.

I was called on the 18th of January 1839 to examine the body of a man, supposed by his friends to have been poisoned, in consequence of the circumstances in which he died. He had been a mason, and of intemperate habits. On the morning of the day on which he died he had breakfasted on beef-steaks, and afterwards dined on the same, in a house near the Fleshmarket. It farther appeared, from the relation of his friends, that he had sat in a low shop in the High Street the greater part of the day, drinking with the customers who came in; and that about five o'clock in the evening, by which time he was in a state of intoxication, he was seized with vomiting. He vomited once or twice, and during the act fell down apparently insensible. He was immediately hurried into a coach and conveyed home. It was supposed that he had been dead before he could be got into the coach.

Two days after death, the body was examined by Dr J. Y. Simpson and myself. The body was that of a strong, muscular, and well-formed man, aged 45, and presented all the external appearance of robust health. The limbs were rigid; and there was considerable lividity on the posterior surface of the body. The face was rather pale than otherwise; and the eyes somewhat sunken. The tongue was in its natural position; and the mucous membrane of the mouth of the natural colour. A pretty large fragment of butcher-meat was found between the fauces. On turning out the *larynx* and *trachea*, several portions of food were seen projecting from the glottis. Upon a further examination, the larynx and trachea, and about two inches of both bronchial tubes were found to be filled with articles of food, chiefly fragments of butcher-meat, of considerable size, which had apparently been swallowed whole.*

The posterior parts of the lungs contained a large quantity of blood. The ventricles of the heart were nearly empty; the left side greatly hypertrophied; and the auriculo-ventricular opening so large as to admit five fingers.

The mucous membrane of the posterior part of the cardiac end of the stomach was mottled with red points and minute extravasations of blood; but retained its natural transparency and thickness.

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* See Plate II. The preparation exhibiting the food in the larynx and trachea is in my possession.

The brain, which was rather softer than usual, was also more vascular, and on being sliced, presented numerous bloody points, appearances which were more distinctly marked in the cerebellum than in the cerebrum.

Death in this case must, I presume, be attributed to asphyxia, produced by the imperfectly vomited matters from the stomach having been carried into the air-passages, during one or more efforts to inspire.

It is highly probable, that sudden death has often occurred in similar circumstances, especially during the insensibility produced by intoxication, and death been either attributed to other circumstances, or its cause has remained unknown, when an examination of the trachea would have solved the mystery; a reflection which strongly points out the necessity of examining the air-passages in every case of sudden death which becomes the subject of legal investigation.

Dr Paris, in alluding to the possibility of such an event as that detailed, occurring during intoxication, or in a spasmodic paroxysm, mentions a case where death resulted from a similar cause, during an attack of epilepsy. It happened in St James's Workhouse, and fell under the particular notice of Mr Alcock. The patient was seized, after a hearty meal of pork, with an epileptic fit, during which he died; when, upon opening the trachea, it was found to contain a quantity of animal matter, resembling the pork upon which he had recently dined.*

One of the most remarkable circumstances in the case which I have detailed, was the great quantity of food which had entered the larynx, and the fact that it extended from the epiglottis, beyond the bifurcation of the trachea.

The most common cases of foreign bodies in the windpipe are those in which, during the act of deglutition, or while playing with some article in the mouth, a sudden inspiration, caused by coughing laughing, or speaking, carries a small body into the larynx along with the current of inspired air. Innumerable cases of this kind are upon record, where fragments of bone, teeth, almond-shells, cherry or plumstones, beads, buttons, beans, &c. have entered the larynx, trachea, or right bronchus, and have caused death in various ways. In some cases death occurs within a short time, preceded by great difficulty of breathing, or convulsions and other indications of certain changes produced in the brain by the dyspnœa and incessant coughing. In other cases, the fatal event has ensued at a very considerable distance of time, being caused by laryngitis, bronchitis, pneumonia, or other affections. In others, the foreign body has been coughed up, or removed by surgical operation.

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* Paris and Fonblanque, Med. Jurisprudence, ii. 58.

In another class of cases, death is caused directly by suffocation, where, during the progress of deglutition, large morsels are attempted to be swallowed, and, by becoming impacted in the pharynx in such a manner as to lie on the epiglottis and keep it shut, cause immediate death. A case of this kind is recorded by Bartholin.* Gilbert the poet terminated his existence in a similar manner. Dr A. T. Thomson relates the case of a boy who died suddenly from this cause, while attempting to bolt a large piece of beef.† Several cases of the same nature are given by Mr Porter, in his valuable work,‡ where death occurred almost instantaneously. In one of these, the obstruction was caused by some rags of lint with which a deficiency in the palate had been stuffed, and which, getting loose and becoming entangled in the morsel the person was about swallow, stopped immediately over the epiglottis, and thus kept it closely shut down. In this case an elastic switch had been passed into the stomach, immediately after the accident, without meeting with the obstruction. Mr Porter points out the obscurity attending these cases, and the difficulty of removing the foreign body; and recommends the operation of tracheotomy as the means best adapted to the extreme urgency of the case, and most likely to prove successful. If artificial respiration must be had recourse to, it can be performed with much greater ease through the artificial opening; or, if the patient is able to respire, the first inspiration made by him through the opening will, in all probability, enable him to expire with sufficient force to throw the foreign body into the mouth.

In such a case as that recorded in this paper, the circumstance of the event occurring when the individual had not been engaged in eating, or had nothing in his mouth at the time, the obscurity of the symptoms, and the suddenness of death, might leave the surgeon in darkness as to the cause of the accident until the body had been opened. If called sufficiently early, it is possible, however, that an accurate diagnosis might be formed from the circumstances under which the event occurred, the symptoms, the ineffectual efforts to respire, (the heart continuing to act,) and the discovery of vomited matters in the mouth. In these circumstances a sufficiently confident opinion might be formed to justify the operation of tracheotomy; but it may be questioned whether the operation would be of any avail in such a case as that recorded here, considering the great extent to which the air-passages were blocked up.

* Cist. Med. p. 450.

† Lancet, 1836–37. ii. 213.

‡ Observations on the Surgical Pathology of the Larynx and Trachea, pp. 223—228.

Cases such as this are, perhaps, of most interest in their medico-legal relations. They are almost certain to occur in circumstances calculated to excite a suspicion of poisoning. The individual has been drinking, perhaps in the company of persons of dissolute habits or suspicious character, and after, it may be, becoming nearly insensible, vomits, and dies suddenly. Such, in some measure, was the case in the instance here recorded, and suspicions of poisoning were entertained in consequence of these circumstances.

An interesting case of a similar nature occurred, more recently, at Newcastle, for the particulars of which I am indebted to Mr Glover, Lecturer on Chemistry in the Newcastle Medical School. A private of the 98th Regiment, died suddenly in a house of bad fame in the Sandgate. The girl in whose company the man was at the time of his death, immediately fled and concealed herself, but was subsequently secured until after the inquest.

It appeared in evidence at the inquest, which sat on the two following days, that the soldier had been drinking, and was in a maudlin state at the time of his visit to the house in which he died. He had lain down on the top of a bed, where he smoked a pipe for about five minutes, and then put down his head with his hand under it. The girl, who had been sitting at the fire in the same room, rose and went to him in about a quarter of an hour, in order to waken him, but found him "cold and stiff." When a surgeon had been called, he found the heart still beating feebly; although the pulse could not be felt at the wrist, he attempted to bleed, but after about a table-spoonful of blood had flowed, the action of the heart was found to have ceased.

The body was examined on the following day by Dr Embleton and Mr Glover. The face, shoulders, and upper part of the chest, were of a livid colour. The brain was healthy. The heart and large blood-vessels contained a large quantity of dark fluid blood. In the mouth a quantity of half-digested bread was found lying on the tongue. In the larynx and trachea was found a quantity of frothy mucus tinged with blood, in which were imbedded a number of translucent white particles, looking exactly like minute particles of bread. These particles were found to be much more numerous in the bronchi, some of which were completely blocked up by them. In the bronchi these particles were imbedded in a brown substance, having all the characters of chyme, being acid, and yielding a precipitate with nitrate of silver. The contents of the stomach very closely resembled the substances found in the air-passages.

From the whole circumstances of the case, it can scarcely be doubted, that death took place from the half-vomited matters of the stomach being carried into the air-passages during inspiration.

I have not been able to find in the records of medicine any cases exactly similar to those here related. It appears to me not unlikely that in many cases of sudden death occurring during intoxication, the cause may have been overlooked from inattention to the possibility of such an event, and from a neglect to examine the air-passages; a reflection which adds additional force to the caution, so often insisted upon by all medico-legal authorities, of minuteness and accuracy in every *post-mortem* examination which may become the subject of judicial inquiry.

Two cases are mentioned by Bonet in some respects similar to the foregoing.* Investigating the cause of death in the carcase of a calf, he found the windpipe completely choked up with the remains of its food. In the trachea of a boy he found the air excluded in the same way by a quantity of semiputrid food. He states that in both cases the epiglottis was too small to cover the superior opening of the larynx, and concludes from this and from the semiputrid condition of the substances found in the windpipe that they must have entered by degrees, and thus gradually choked up the passage; an opinion, the correctness of which may be questioned, when the sensibility of the parts, and the great irritation caused by foreign bodies, is considered. It appears more probable that death had occurred suddenly, from the entrance, at once, of the half-digested contents of the stomach into the trachea, by their being inhaled during vomiting.

II. *Case of Poisoning with Laudanum.*—The following case of accidental poisoning with laudanum is one of considerable interest, not only as regards the smallness of the dose, but in regard to the detection of the poison by chemical analysis.

A gentleman, aged 56, of robust form, temperate and regular habits, had been subject for several years to slight chronic catarrh, and occasional pains in the bowels, for which he sometimes took a pennyworth (two drachms) of the *Tinctura Opii Camphorata.* A few days before the accident, he had complained of slight flushing of the face and soreness of the eyes, and on the evening of Sunday 14th July 1839, having been somewhat harassed by his cough, he sent to a druggist in the neighbourhood for his accustomed quantity of paregoric. The bottle sent having been several times at the same shop for a similar supply, had on it a label bearing the druggist's name, and the words "London paregoric elixir." It was returned with the same label, and the contents were taken a few minutes before ten o'clock, the gentleman's wife remarking at the time that it was surely laudanum, to which he replied, "do you not know that there is laudanum in paregoric." Some water-gruel was prepared for him, some of which he took soon after the draught. His wife went to bed about eleven o'clock, and almost immediately fell fast asleep. About three o'clock in the morning, as she supposed, she was awakened by his rising to take a drink of the water-gruel, the remains of which he gave her at her request. She again fell fast asleep, and awoke about four o'clock, when she found him breathing very hard, and remembering the remark made regarding the draught, she became anxious and attempted to waken him, but found that he was insensible. She then alarmed a neighbour, and after various ineffectual attempts to rouse him had been made, they sent for medical assistance. This was obtained after considerable loss of time. He was first seen about seven o'clock by Mr Jaap, who gave an emetic, and tried several means in order to rouse the patient, but all of these proving ineffectual, he called in additional advice.

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* Sepulch Anat. Lib. ii. Sec. ii. Obs. viii.

About twenty minutes before nine, when I first saw the patient, eleven hours after swallowing the draught, I found the pulse very small and rapid, the face rather pale, the pupils contracted, the breathing somewhat loud and slow. After learning the smallness of the dose, and the time that had elapsed, I did not then think it advisable to waste time using the stomach pump. The means upon which I chiefly relied were cold water, poured in a continued stream upon the head, or dashed on the face, and dragging the patient up and down between two men. Various other means were also tried; in particular, the nostrils were made to bleed; small doses of carbonate of ammonia, and a considerable quantity of a strong infusion of coffee were given at intervals.

I was at first inclined to hope that these means would prove successful. The patient evinced a considerable degree of sensibility, especially when the water was dashed on his face,—looking up, and contracting his features into that peculiar expression commonly put on by a person in the full possession of his faculties when similarly treated;—and at the same time putting up his hand before his face and under his chin, so as to catch the drops of water. On one occasion, at least, when thus roused, he answered "yes" to a question. Notwithstanding the vigorous use of these and other means, the pulse rapidly became so enfeebled as to be imperceptible at the wrist, and he was soon incapable of exercising any muscular power in standing, although supported on each side. A small quantity of brandy and water was then put into his mouth which ran out; and he was immediately got into bed, with the intention of trying further means, but the breathing almost instantly ceased.

The bottle out of which the draught had been taken, was at the time examined by Mr Jaap, Mr Macfarlane, surgeon, at that time one of the most distinguished students of the extra-academical school, by another intelligent medical student present, and by myself, and in the opinion of all, distinctly smelt of *laudanum*, no odour indicative of paregoric being perceptible. A drop or two which remained in the phial enabled Mr Jaap and myself to taste it, and neither of us had any hesitation in pronouncing it to be laudanum. The phial was examined in the evening by Mr Lawrie, Clerk Street, who at first thought the odour was slight; but on holding the phial for a few moments in his warm hand, appeared to be convinced from the odour, as also from the taste of the moisture which remained, that it had contained laudanum.

On the sides of the phial, there were observed a number of small points, one or two of which appeared to be fragments of cork, but the rest rather suggested the idea that the laudanum had been poured from an unfiltered solution. The cork of the phial was quite entire.

The bottles containing the paregoric and laudanum in the apothecary's shop from which the medicine had been obtained, were afterwards examined. I found the bottles standing side by side on the shelf, the one containing laudanum being nearly full, the other about half empty. Both tinctures were quite transparent; but on the upper part of the laudanum bottle, above the surface of the tincture, I observed a number of minute points adhering to the inner surface of the glass, such as were seen in the phial, but smaller.

Inspection.—The body was examined two days after death. The external appearance was that of a man enjoying excellent health. The form did not appear to indicate an apoplectic tendency. There were no appearances of putrefaction, and the lividity observed on the posterior surface of the body was inconsiderable. On removing the cranium a considerable quantity of dark fluid blood was found in the sinuses of the *dura mater*. The larger veins on the surface of the cerebrum and cerebellum were turgid, but not to any remarkable extent. Over the whole surface of the hemispheres serous effusion was found beneath the arachnoid. About a drachm and a half of fluid was contained in one lateral ventricle, and about half a drachm in the other. The substance of the brain was in every respect natural, and nowhere presented any morbid appearances.

Some old adhesions were found between the surfaces of the pleura. The lungs contained, posteriorly, a considerable quantity of blood, which flowed out mixed with frothy mucus, on sections being made; but they crepitated perfectly in every part, and presented no alteration of structure.

The heart was healthy, and its different cavities of their natural size; the left side was empty, but the right auricle and ventricle contained black semifluid blood and a fibrinous clot, which extended for some inches along the pulmonary artery.

The viscera of the abdomen presented no morbid appearances. The stomach contained what appeared to be the remains of some gruel, and a few dark points, evidently coffee-grounds. The duodenum contained also a similar fluid. These fluids were collected, the inner surface of the stomach being carefully washed out. No odour of opium could be perceived.

The bladder contained six ounces and a half of urine, which was collected. There was no disease of the genital organs.

The quantity of urine collected induced me to analyse it, although without any hope of detecting in it indications of opium. It was accordingly examined in the manner adopted by M. Barruel, who has represented himself as successful in a search of this kind, but no trace of morphia could be discovered.

In examining the contents and washings of the stomach, I pursued the method recommended by Dr Christison in his valuable treatise. The steps adopted may be briefly enumerated. The fluid was acidulated with acetic acid, stirred and filtered. The filtered fluid was evaporated in the vapour-bath to the consistence of syrup, redissolved in strong alcohol, boiled, filtered, and again evaporated to the consistence of syrup; this was redissolved in distilled water and again filtered. A solution of acetate of lead was then added as long as precipitation took place, and the precipitate separated by filtration.

(a.) The precipitate, being washed and suspended in water, was treated with a stream of sulphuretted hydrogen. After filtration and boiling, the fluid was concentrated by evaporation. This, amounting to about ten minims, slightly coloured, struck a deep olive-brown, with a single drop of a solution of the permuriate of iron; very different from the cherry-red colour struck with permuriate of iron, in a pure solution of meconic acid, but somewhat similar to the colour given in a comparative experiment, in which the solution of meconic acid was slightly coloured with coffee.

(b.) The filtered fluid was also treated with sulphuretted hydrogen and filtered. Ammonia was then added as long as precipitation took place. The precipitate after being collected, washed, and drained on a filter, was boiled in alcohol, and the alcoholic solution, being filtered, was evaporated to dryness. A crystalline residue was obtained, slightly coloured, a small portion of which, on being brought in contact with a drop of nitric acid, assumed an orange colour, and then passed into a bright yellow solution.

In order, if possible, to get rid of some of the colouring matter, the remaining part of the crystalline mass, obtained in the second part of the process, was redissolved in alcohol and digested in a little animal charcoal. It was then filtered and again evaporated.

The mass now obtained, somewhat purer, gave a distinct orange coloration with nitric acid. A small quantity of it was also added to a mixture of iodic acid and starch, moistened and mixed together on a white porcelain vessel; one part of the mixture immediately presented a deep blue colour, and the rest was converted into a reddish brown.

The results of these experiments were seen also by Mr Kemp, and he agreed with me in thinking that the colour produced by the permuriate of iron, in itself a fallacious test, afforded an indistinct indication of meconic acid; and that the changes produced by nitric acid and by iodic acid and starch supplied unequivocal evidence of the presence of morphia.

The history of the preceding case presents at first sight several remarkable features, at variance with the commonly received opinions as to the effects of opium, and the difficulties attending its detection in the contents of the stomach.

1. *Cause of death.*—Before the result of the chemical analysis was known, several opinions were entertained and propagated as to the cause of death.

It may be remarked generally, that, from all the circumstances of the case, it cannot be doubted that the only medicine taken by the deceased before his death was a seidlitz powder and the contents of the phial as obtained from the druggist, whatever they were; death, therefore, was either caused by this or by disease. The young man who sold the drug confidently denied that he could have given laudanum, and asserted that death must have resulted from disease. Many who appeared even to be satisfied that the odour of the phial, afforded sufficient evidence that laudanum had been taken, yet contended that the individual had died of serous or simple apoplexy. This opinion they founded partly upon the previous history of the individual as affording some proof of a tendency to apoplectic disease; partly also upon the smallness of the dose; but chiefly upon the presumption that the patient having risen out of bed at three o'clock, five hours after taking the draught, was incompatible with the known effects of opium.

As to this opinion, it may be remarked, in the first place, that before any chemical analysis of the contents of the stomach had been made, the proof of laudanum having been taken appeared to me to be complete. The smell of a substance so familiar and peculiar, distinctly recognized and attested by several persons, appears to me to be sufficient evidence of its nature, especially when it is corroborated by the taste of the liquid, and by the testimony also of the boy who bought the medicine, who accurately described the colour of the liquid, and stated that the bottle was almost full, which was the case with the laudanum bottle, while that containing paregoric, as we afterwards found, was half empty. 2. The grounds upon which it was supposed that the deceased had been predisposed to apoplexy were, that his father had died of that disease, and that he himself had once, several years before his death, suddenly fallen down; and that he had occasionally complained of flushing of the face, where he had also had one or two slight erysipelatous attacks with soreness of the eyes. These are certainly but very doubtful signs of such a predisposition. The falling down appears to have been a syncope, for it was a momentary occurrence, being neither preceded nor followed by any uneasiness. Although the other complaints may, in the opinion of some individuals, indicate what is mysteriously and ignorantly called a determination of blood to the head, or rather to the face, it is exceedingly questionable whether they can be connected with a habit of body predisposed to apoplexy. As to the father having died of apoplexy, it cannot be doubted that the tendency to this disease is frequently transmitted from parent to son; but this is by no means invariable, and the existence of disease in the parent, therefore, can only be considered as affording corroborative evidence of the existence of a predisposition in the son, when that is rendered probable by other circumstances. But granting that such a predisposition existed, it is surely unphilosophical to resort to remote and problematical causes if the one known to be in operation be sufficient to account for the phenomena. 3. Was then the quantity of laudanum taken in this case, (two drachms), sufficient to cause death? I think it cannot be doubted that it was; for although this quantity may have been given with no injurious effects to person suffering under violent pain or excitement, yet the known effects of two or three grains of opium, given medicinally to procure sleep, may readily lead us to believe that a quantity of laudanum equal to ten grains would cause death. In this opinion I am supported by that of Dr Paris, who says that four grains may cause death;* and by that also, I conceive, of Professor Christison, who relates, as confirmatory of the statement of Dr Paris, a case which occurred to Dr W. Brown of this city, where a dose of four grains and a half of opium, taken by an adult, along with nine grains of camphor, was followed by the usual signs of narcotism, and death in nine hours.† Little of that insensibility to the effects of opium produced by habit could be supposed to exist in the case under consideration, for although the person had been accustomed, when affected with cough or pain, to take two drachms of paregoric, yet this quantity, which contains only the soluble part of half a grain of opium, was only taken at considerable intervals of time, and was never exceeded; and it does not appear that insensibility to the effects of a large dose of any narcotic is produced by the frequent use of a very small dose, but only when the dose is gradually increased in size. In addition, it will immediately be seen, as indeed might be suspected from the detection of the poison after death, that the quantity of laudanum taken was probably somewhat more than was at first supposed. 4. As to the circumstance upon which the opinion, that apoplexy was the cause of death, chiefly rested, namely, that the individual had spontaneously risen out of bed and taken a drink, five hours after having swallowed the draught, the importance of this fact, in determining to what cause death should be attributed, and the singularity of it, if death were really caused by poisoning, induced me to make very careful inquiries into the circumstances.

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* Paris and Fonblanque's Medical Jurisprudence, ii. 388.

† Professor A. T. Thomson states that half an ounce of the tincture has proved fatal.—Lancet, 1836-37, ii. 189.

On questioning the widow at different times as to the time at which her husband rose, I learnt that, in the first place, she had been sound asleep before he rose, and fell fast asleep immediately after, and that she only guessed it to be three o'clock, from the time which she supposed she had passed in sleeping. Again, on questioning her as to the degree of light, she first stated that it was quite dark, so that her husband had to grope for a drink, and then that there was sufficient light to enable her to see the figure of her husband between her and the window, from which she imagined that the day had begun to break. Now, at the time this accident happened, (the 14th of July,) it must have been perfectly light at three o'clock in the morning, and as the blind of the window only was drawn, the room would never have been described as quite dark, had it been that hour; and again, there is at that season of the year, sufficient light, from sunset to sunrise, to enable one to distinguish the bars of a window through the blind, and light certainly sufficient to enable one to distinguish a figure moving between him and the window; and as this is all which was observed in this case, the window being directly opposite the bed, it is, I think, not improbable that it may have been one, twelve, or even half-past eleven when this event happened. Although these statements render it probable that the individual may have risen at any period after eleven o'clock, the time at which his wife fell asleep, still it must be regarded as a circumstance somewhat singular, that a person should have been capable of spontaneously rising at a period certainly considerably greater than one hour, after a dose of laudanum had been taken, which ultimately proved fatal.

In poisoning with opium, the stupor is in general completely formed in less than one hour, especially when it has been taken in solution; yet there are not wanting cases in which its formation has been delayed for a longer period. Such a case is related in Corvisart's Journal, where two ounces and a half of the tincture, with a drachm of the extract, were swallowed, and no material stupor followed, until considerably more than an hour had elapsed.[*] A case is related by Mr Shearman, which shows that certain circumstances may retard the operation of opium. In this case, intoxication produced that effect. A habitual drunkard, while intoxicated to excitement with beer and spirits, took two ounces of laudanum, and had no material stupor for five hours, during which period vomiting could not be induced, and he eventually died from the effects of the narcotic.[†] Professor A. T. Thomson refers to a case, apparently of pure poisoning with opium, where an ounce of the tincture was taken at midnight; and in which the person slept and awoke at his usual hour, without having felt any of the influence of the poison. After rising, vomiting came on, and continued all day, but no other bad effect followed.[‡] This was a case, certainly, which was not ultimately fatal; but, at the same time, it may be remarked, that the dose was a fatal one to a person unaccustomed to laudanum, and that the individual in this case was probably saved by the spontaneous occurrence of vomiting.

These cases are, I conceive, sufficient to show that such a variation from the usual effect of opium in poisonous doses is occasionally met with; and that this, in all probability, happened in the case under consideration. The length of time which elapsed in this case before the soporific effects of the poison were developed, may perhaps be attributed partly to the smallness of the dose, which was one little more than barely sufficient to cause death; and partly also to the circumstance of its being taken along with water-gruel, from which cause the absorption of the poison would go on more slowly. Another possible explanation suggests itself, namely, that the supervention of natural sleep may have retarded the absorption of the poison, or its action upon the nervous system. The occurrence of sleep certainly appears to retard the operation of the irritant poisons,[§] but I am not aware of any facts which tend to show that it exerts a similar influence upon the agency of narcotics, unless the case here recorded, and the one cited from Dr Thomson's lectures, can be regarded as affording some evidence in support of such an hypothesis.

In addition to the general character of the symptoms preceding death in this case, the paleness of the face, the quick pulse, and contracted pupils, &c. one circumstance will be observed in particular, which I think strongly confirms the opinion that death resulted from the operation of a narcotic poison. I refer to the circumstance that, even one hour, or an hour and a half before the death of the individual, he was still to a certain, although to a limited extent, capable of being roused, and displayed unequivocal signs of sensibility. This, so far as I am aware, has never been observed, at least, so short a time before death, in a case of apoplexy, fatal in twelve or thirteen hours.

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[*] Christison on Poisons, 618.

[†] Ibidem.

[‡] Lancet, 1836-37, ii. 769.

[§] See Christison, op. cit.

Lastly, the morbid appearances taken in connection with the moral evidence of laudanum having been taken, and the character of the symptoms, and the rapidity of their progress to a fatal termination, can leave very little doubt that death was caused by opium; for although the morbid appearances were such as might have been met with in serous apoplexy, yet there is no case, I believe, upon record, of simple serous effusion to that extent having caused death in so short a space of time as twelve hours.

Such were the views of this case, and such the data upon which I ventured, previous to the completion of the chemical analysis of the contents of the stomach, to give a pretty positive opinion as to the cause of death. The subsequent detection of the poison affords unequivocal evidence that death resulted from its operation, for I believe it will be admitted to be in the highest degree improbable that morphia could be detected by its chemical tests after being twelve hours in the living body, without having been taken in sufficient quantity to cause death. I have chosen, in reviewing this case, to examine how far an opinion could be given from the symptoms and morbid appearances alone, as it was very unlikely that any evidence would have been obtained by chemical analysis, in a case where so small a quantity of opium had been taken. As the medical jurist has frequently failed to detect any traces of opium, in cases where a much larger quantity has been taken than in this instance, and where it had been retained, too, for a much shorter time in the stomach during the continuance of life, it is of the highest importance to know how far he can found an opinion as to the cause of death, on the character and progress of the symptoms, and on the morbid appearances alone; and it is interesting to find that, in a case like this, in several respects obscure and anomalous, at first sight, a pretty positive opinion could be given from these sources of evidence, which was afterwards fully corroborated by the detection of the poison.

2. *Detection of the Poison.*—Impressed with the fact, that the most experienced chemists have occasionally failed in obtaining any, or at least but faint indications of morphia and meconic acid, in analysing the contents of the stomach after quantities of laudanum, varying from half an ounce to two ounces, had been swallowed, and the fluid had remained but a few hours in the stomach, I undertook an analysis in this case, rather from a sense of duty than from any hope of obtaining evidence of the poison by its tests. Believing that only two drachms of laudanum had been taken, and that that quantity had caused death, I concluded that in all probability it must have been totally absorbed; and that it was there-

fore hopeless to look for any traces of it; the more so, as I was aware of the statement of Professor Christison, that only very faint indications could be obtained when the soluble part of ten grains of opium, a quantity at least equivalent to two drachms of laudanum, was actually put into an organic mixture, and that mixture examined by the same method as I pursued. I was therefore not a little surprised when I obtained what I consider to be distinct evidence of the presence of morphia, and was led immediately to suspect that a much larger quantity of laudanum than was at first supposed, had been taken. In consequence of this suspicion, I carefully examined the boy who had been sent to purchase the medicine, and obtained from him so accurate and circumstantial an account of the manner in which the laudanum had been measured, as to leave no doubt in my mind that this was actually the case. After accurately telling the place where the laudanum bottle stood in the druggist's shop, and mentioning that it was nearly full, which was the case, while those next it were not so, he described how the laudanum had been measured, without any leading questions being put to him. From the description, it would appear that the young man had poured out a quantity of laudanum into the measure, and looked at the graduations on the glass, but after pouring it into the phial brought for the medicine (an ounce phial), he seemed to think there was too much, for he returned a small quantity of it into the measure, and, without examining by the scale how much he had poured out, returned it into the original stock. On repeatedly putting the phial into the boy's hand, and asking him to point out with his finger how much liquid had been put into it, he invariably placed his finger on a point which indicated that the phial had been three-fourths full at the first measurement, and half full after the measurement had been corrected, and the phial given to him by the druggist. From the smartness of the boy, the circumstantial manner in which he detailed the facts, and his consistency in repeating them, as well as from the circumstance that it was impossible, almost, at his age, that he could have conjectured to what conclusions they would lead, I have no doubt that the phial had contained about half an ounce of laudanum.

Granting, then, that half an ounce of laudanum had been taken, the case must still be regarded as interesting, and shows the importance of pursuing the chemical analysis, even in cases where little hope can be entertained of deriving additional evidence from that source. I am not aware of any case upon record where so small a quantity of opium has been detected by chemical tests. There are, however, several cases to be found where the same quantity of laudanum had been taken, and where life had been prolonged nearly as long as in this instance, and where unequivocal evidence of another kind was obtained from the contents of the stomach after death. The following are cited by Professor Christison. "In Knape and Hecker's Register, there is the case of a girl who died about eight hours after taking half an ounce of laudanum; and the reporters found, that an extract prepared from the contents of the stomach caused deep sleep in frogs, chickens, and dogs, and threw some of them into a comatose state, which proved fatal. Wildberg has related a very interesting case of a young lady of Berlin, who had been seduced, and, finding herself pregnant, swallowed about half an ounce of laudanum in the evening, and died during the night. In this instance, the contents of the stomach had a narcotic odour, and their extract when given to a young dog caused excessive sleep, reeling, drunkenness, palsy of the legs, convulsions, and death. M. Petit has related another case, fatal in about ten hours, where the contents of the stomach had the smell of opium; and their alcoholic extract had a bitter taste, and killed guinea pigs with symptoms of narcotism."* In this instance it was estimated, that about a drachm of the extract had been taken.†

With reference to the case which is the subject of these remarks, I made several comparative experiments, in order to ascertain how small a quantity of laudanum in a mixed fluid would afford evidence of morphia and meconic acid. On adding successively to three mixtures of about three ounces of water-gruel each, with salt, two drachms, a drachm and a-half, and one drachm of laudanum, I found that by careful manipulation, unequivocal evidence of the presence of opium was obtained from each. The residue of the process for the detection of the morphia gave a red colour with nitric acid, passing gradually into a yellow solution. That for the detection of meconic acid assumed a deep reddish brown with perchloride of iron. I found that in several instances in using iodic acid and starch, as a test of the presence of morphia in these experiments, that the brownish yellow colour characteristic of the action of iodic acid on morphia, was produced, although no evidence of free iodine was obtained by its action with the starch. This might have been anticipated, considering the very minute quantity of morphia which must have been present. When a considerable excess of iodic acid is added to a minute quantity of morphia and starch in solution, the blue colour produced is always extremely evanescent, the whole solution rapidly assuming a permanently brownish yellow colour, in which no free iodine is indicated by starch: the blue colour cannot be recalled but by the addition of more morphia. This circumstance distinguishes the action of morphia with iodic acid, from that of albumen with the same substance, which (as pointed out by Mr Davidson,) also decomposes it, and sets the iodine free: in the latter case, the blue colour is more lasting, and when it ultimately disappears leaves the solution colourless. It is almost unnecessary to say that in the process pursued for the separation of morphia from mixed fluids, any albumen which may have been originally present will be entirely removed.

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* Op. cit. p. 639.

† Journ. de Med. xxiv. 272.

III.—*Second Case of Poisoning with Laudanum.*—I was lately permitted, by the kindness of Professor Alison and Dr John Reid, to examine the body of a woman who had died in circumstances somewhat resembling those mentioned in the preceding case. The female referred to had been under Dr Alison's care in the Royal Infirmary some weeks previous to the accident, and at that time had been affected with rheumatism. Two days before her death she had pain in her bowels, for which she had taken a pennyworth of laudanum. On the following evening she again sent for the same quantity, but appeared to have got considerably more, for the girl who bought it, remarked when she brought it home, that she had "gotten a muckle pennyworth," and that it was about twice as much as she had got the previous night. The character of her neighbours and friends prevented me from obtaining a very accurate account of matters, or one on which much reliance could be placed; but it appeared that the whole of the laudanum had been taken about ten o'clock; that about twelve or one a neighbour had looked in and asked her how she felt, and that she had replied cheerfully and readily. Her husband awoke about five and spoke to her, but received no answer; he then fell asleep; and on again awakening, discovered that she was dead.

On examination of the body, no morbid appearances of any note were discovered in the viscera of the trunk. The external table of the left temporal bone was carious, and the temporal muscle at that part infiltrated with purulent matter. The arachnoid membrane was elevated and separated from the surface of the brain by serous fluid, and an inconsiderable quantity of serum was found in the right lateral ventricle.

A careful analysis of the contents of the stomach was made; but the only evidence obtained from this source was an imperfect and equivocal coloration on bringing the residue of the process for the separation of morphia into contact with nitric acid; and a faint bitterness on applying a small portion of it to the tongue.

This case in part corroborates the inferences which I have ventured to draw from the one which precedes it. It is to be regretted that a more circumstantial account of the symptoms preceding death could not be obtained. The absence of any morbid appearances sufficient to enable us to ascribe death to natural causes; the quantity of laudanum which had been taken; and the rapidity of the fatal termination, render it highly probable that the woman died from the effects of the poison. If this was the case, it would appear that narcotism had not been formed for several hours after the laudanum was taken.

To the foregoing cases many might be added, calculated to show the carelessness with which medicines are occasionally dispensed. A few simple regulations to be observed by the druggist in the arrangement of the more active medicines would prevent the occurrence of such a mistake as that related in the first of the foregoing cases. Nor is it, I believe, to be doubted, that fatal accidents might be prevented; and that much advantage would accrue both to physicians and patients in ordinary circumstances, were some means adopted to insure a uniformity in the strength and quality of the active medicines in common use. My own experience coincides, I believe, with that of all who have bestowed any attention on the subject, and bears me out in the conviction, that many patients in this place are every day receiving medicines which are nearly inert. The consequences which may result from such a circumstance are easily conceived. The physician is disappointed in the effects of his remedies, and his patient suffers misery from the delay. Or if, on the other hand, an individual has habituated himself to the use of some active drug, such as laudanum or prussic acid, and has gradually increased the dose of a preparation obtained at a particular shop, and should accidentally purchase his accustomed allowance at another shop, he may be poisoned by receiving a medicine, which is double the strength of that which he has been accustomed to take.

ART. XIII.—*Cases of Excision of Bones.*

I. *Excision of a portion of the Lower-Jaw.* By WILLIAM PIRRIE, M.D., Professor of Surgery in Marischal College, Aberdeen.

In the end of November 1839, Thomas Grant, aged 19 years, applied to me under the following circumstances. The left side of the lower-jaw, from near the symphysis to the angle was diseased, and so extensively enlarged, as not only to produce great swelling and deformity of the face, but also, by pressing inwards upon the tongue, considerably to impede its movements. The diseased portion of bone also hung down upon the upper part of the neck, and extended considerably backwards. The soft parts of the cheek and upper region of the neck were very much inflamed, giving rise to very diffused swelling; and two abscesses had burst over the middle of the diseased portion of bone. The pain in the bone was at times most excruciating. He informed me that the disease had commenced about three years ago, when it was supposed to arise from the irritation of a carious tooth, which was at the time extracted, without affording him any alleviation of his sufferings.

From the nature of the case, it was evident that excision of the diseased portion of bone was the only remedy; and several of my professional brethren, well qualified to judge, were decided as to the necessity of such an operation. With the assistance of Mr Fowler, surgeon in Aberdeen, and my senior pupil, the operation was performed on the 15th of February 1840, in the following manner.

I commenced my first incision at the middle of the lower lip, and extended it downwards over the front of the chin, to a little below the under margin of the diseased bone. From the termination of that incision, I ran the scalpel along the entire inferior border of the bone, turning up behind the angle, and ending about midway between it and the condyloid process. The extensive flap contained within those incisions was next dissected up and laid upon the upper part of the face, so as fully to expose the diseased portion of bone. The jaw was then sawn through immediately, at the left side of the symphysis, and afterwards obliquely through the ascending ramus, opposite the last molar tooth, particular care being taken to protect the vessels by pressing them inwards. The section of jaw was then carefully relieved from its internal soft attachments, by drawing the knife along its internal surface, keeping its edge close upon the bone. The diseased soft parts connected with the openings of two abscesses on the cheek, and some diseased tissues in the upper region of the neck, were then cut out, and after suppressing the hemorrhage, which was excessive, the flap was brought down, and, by means of a few stitches and adhesive plaster, the edges of the wound were kept in apposition.

About four weeks afterwards, on the 14th of March, union was entirely effected, leaving so little external deformity, as to show but very slight traces of such an operation.

The figures in Plate III. give views of the appearance of this young man before and after the operation. Fig. 1 is his appearance before operation; Fig. 2 is his appearance after operation; and Fig. 3 is a view of the bony mass extirpated, seen of the natural size.

Aberdeen, 1st June 1840.

II. *Case of Excision of the Elbow-Joint.* By WILLIAM C. FOWLER, Esq. Surgeon, Lecturer on Medical Jurisprudence to King's College and University, Aberdeen.

William Cow, a young man, 17 years of age, from the village of Lumsden, in the county of Aberdeen, applied on the 5th of April 1840, for advice and treatment for disease of the elbow-joint. About eighteen months ago, he began to suffer from the ordinary symptoms of that form of white swelling which commences in the bones. After experiencing a great deal of suffering, the soft parts within and around the joint became involved; and at last sinuses, communicating with the interior of the joint, and with the diseased portions of bone, made their way to the surface, and discharged, in considerable quantity, purulent matter, without any diminution of the swelling, and with but very slight alleviation of the pain. The enlargement of the joint was very considerable; the skin was slightly livid and glistening, and the soft parts very extensively diseased. In addition to those local symptoms, the boy had laboured under hard, dry cough for about six months; but on examination of the chest, there was no evidence of organic disease. The pulse was never under 138, during the fortnight prior to the operation, when he first came under my care.

I resolved on performing excision of the joint, which I did on the 17th of April 1840, with the assistance of Dr Pirrie, Professor of Surgery in Marischal College, and several of my pupils.

Two parallel incisions were made, the one along the radial, and the other along the ulnar aspect of the arm, and extending from nearly three inches above, to the same distance below the joint; those two were then united by a transverse incision across the root of the olecranon process. The flaps comprehended within those incisions were then dissected upwards and downwards, so as fully to expose the posterior aspect of the joint. The olecranon process was then removed by means of Liston's forceps; and, after dislocating the humerus from the bones of the fore-arm, it was carefully detached from the soft parts in front, and then sawn across about an inch above its extremity. In consequence of extensive disease of the bones of the fore-arm, I found it necessary to relieve the radius and ulna from the soft tissues, to at least an inch and a-half below their upper extremities, at which situation they were respectively sawn through. The soft textures around the joint were greatly diseased, and, to save the lingering process of sloughing, they were completely removed, so as not to leave any unhealthy structure within the wound. The flaps were then brought together, and their edges kept in apposition by means of sutures and adhesive plaster.

The wound healed kindly; and before he left this for the country, which he did on the 23d of May last, five weeks after the operation, the use of his hand was complete, and the voluntary motions of the elbow wonderfully restored. The cough had completely subsided; his pulse was down to 80; and his general health perfectly re-established.

I have since heard from him; and he states that the arm is now quite well.

Aberdeen, 8*th June* 1840.

PART II.

CRITICAL ANALYSIS.

ART. I.—*Essai Statistique sur la Mortalité du Canton de Genève, pendant l'année* 1838, *considerée tant en général, que sous le rapport nosologique.* Par Dr MARC D'ESPINE, Membre du Conseil de Santé, et Medecin des Prisons du Canton de Genève. Paris 1840. pp. 130.—*Statistical Essay, general and nosological, on the Mortality of the Canton of Geneva during the year* 1838. By Dr MARC D'ESPINE.

THE Canton of Geneva is situate three degrees of longitude east from Paris, and in the 46th degree of latitude. It contains about eleven square leagues of surface, and includes a portion of the western extremity of the lake of Geneva.

The basin, in the middle of which is situate the canton of Geneva, is a broad valley, which runs from the north-east to the south-west, between the chain of the Jura on the one side, and the mountains of Salève near Voirons, on the other. The valley is closed in on the south-west, three leagues from Geneva, by a range of hills, known by the name of the Mount of Sion, but is open to the north-east, where it is bounded by the lake, which runs in a somewhat semicircular direction for from 15 to 17 leagues.

In consequence of this peculiar disposition, the most prevalent winds in the canton are from the north-east and south-west. The first of these is a cold dry wind, almost always accompanied by a pure clear atmosphere; and the latter is generally attended by showers and blasts.

The town of Geneva is situate at the extremity of the lake, at the point where the Rhone leaves it to direct its course towards the south-west. Another large river, the Arve, which rises from the glaciers of Mont Blanc, traverses the canton, and falls into the Rhone about a quarter of a league below Geneva.

The canton is thus naturally divided into three portions or districts; the first being comprised between the lake, the Arve, and the frontier of Savoy; the second, between the Arve, the Rhone, and the frontier of Savoy; and the third, between the Rhone, the lake, the frontiers of France, and the canton of Vaud.

The first district contains a superficies of 6872 hectares. A hectare is about 2½ English acres. The ground is undulating, consisting of little hills and valleys. It includes, besides the two suburbs of the town, a village of 2268 inhabitants. The rest of the population are dispersed in hamlets, and isolated cottages. The total population of this district is 11,309; or 1.65 to the hectare.

The second district includes 7887 hectares. Its surface is undulating as in the first district, and it contains a small town of 4367 inhabitants. The rest of the population are dispersed in villages, hamlets, and cottages. The total amount of population is 11,431; or 1.44 to the hectare.

The third district consists of 9349 superficial hectares. It has no town, and its population amounts to 7923; or 0.85 to the hectare.

The town of Geneva, which is in a manner situated in the centre of these three districts, is densely peopled for its size, the houses are lofty, and it is enclosed on every side by ramparts; but as it is built on undulating ground, and there is a hill of considerable elevation in its centre, it is pretty well ventilated, and is healthy. Its population amounts to 28,003.

The climate of Geneva is drier, and the winter colder, it is also more exposed to the winds than the plains in the centre or even the north of France; but there are fewer fair days than in the south of France. The mean annual temperature is 9°.8 Cent., or 49.° 6′ Fahr.

In 1838 there occurred 1405 deaths in the city and canton, being 91 fewer than the previous year. This gives an average of one death in every 41.7 inhabitants. If, however, from the total number of deaths, 82, who were still-born, be deducted, there will be left only 1323, giving an average of one death in every 44.3 of the population. Of the total number of deaths 626 occurred in the town of Geneva, and 779 in the country; or one death out of every 44.7 of the inhabitants of the town, and one in every 39.3 of the country. Of the three districts, the greatest mortality occurred in that situated between the river Arve and the lake, being one in 38, this district being at the same time the poorest; whilst the least mortality occurred in that which is situated between the Rhone and the lake, which is at the same time the richest district, the mortality being only one in 45.2.

The number of still-born infants was greater in the town than in the country, being in the proportion of 1 to every 630 of the population of the town, and 1 to every 639 of the country. In the country, too, the greatest number of still-born occurred in the poorest district, or that situate between the Arve and the lake; the least mortality did not, however, occur in the richest district, but in that situate between the Arve and the Rhone, where the proportion was reduced to 1 in 816. M. D'Espine thinks it probable that this may be owing to that district being better provided with medical aid than the others.

Of the 1405 deaths, 672 were males, and 733 females, which gives 1 death in every 41.8 males of the population, and 1 in every 41.7 females. In the town and country, however, the relative proportion of deaths amongst the two sexes differed widely, the mortality of the males being greatest in the town, and that of the females in the country. Thus in the town 1 male died out of 40.6, whilst only 1 female died out of every 49. In the country 1 male of every 42.9 died, whilst the female mortality increased to 1 in every 36.4. Of the still-born infants, 46 were males, and 36 females.

The mortality varied very much according to the season of the year, as may be seen in the following table, where the figures indicate the number of deaths which occurred each month.

January,	-	151	May,	-	123	September,	-	97
February,	-	116	June,	-	135	October,	-	116
March,	-	132	July,	-	106	November,	-	103
April,	-	123	August,	-	101	December,	-	102

The mean mortality for the twelve months being 117, it follows that the months of September, December, November, July, February, and October, are below that mean, and the other months above it; the mortality having been least in the month of September, and greatest in January.

The influence of the seasons on the mortality for town and country also varied. Thus in the town the greatest mortality occurred in the month of March, whilst that for the country was in the month of January. In the town the mortality was least in the month of November, whilst in the country it occurred in the month of September.

The following table shows the influence of age on the mortality.

From	0 to 1 year,	there died	272	—82 of whom were still-born.
	1 to 5,	-	174	
	5 to 10,	-	61	
	10 to 15,	-	44	
	15 to 20,	-	48	
	20 to 30,	-	101	
	30 to 40,	-	99	
	40 to 50,	-	83	
	50 to 60,	-	117	
	60 to 70,	-	161	
	70 to 80,	-	169	
	80 to 90,	-	77	
	90 to 100,	-	10	

From this it appears that in the canton of Geneva, 31 out of the hundred die before they reach the age of 5 ; 39 of the hundred between the ages of 5 and 60; and 30 of the hundred survive this last mentioned age, but do not complete the century. The chances of a prolonged existence appear to be greater for the country than for the town, as the relative proportions of those who die above the age of 60 is only 26 per cent. for the town, but 33 per cent. for the country; showing a difference of no less that 7 per cent. in favour of the country.

The mean duration of life is now reckoned one of the best means of ascertaining the healthiness of a country, and the vital strength of its inhabitants. At Geneva, according to M. Ed. Mallet, the mean duration of life from the year 1700 to 1750, was 32 years; from 1750 to 1800, 34 years; from 1801 to 1813, 38 years; and from 1814 to 1833, 40 years. In 1837, the mean duration of life, calculated from the mortality tables, by M. Mallet, was 44 years and 6 months. In 1838, however, even after abstracting the still-births, the mean duration of life falls to 37 years and 4-10ths.

The mean duration of life, however, differs for town and country; thus in the town of Geneva for 1838, it was only 35.5 years, whilst in the country districts it was 39 years. In 1837, the calculated mean duration for the town was 43 years and 5 months, whilst for the country it was 45 years and 6 months; for both these years giving a difference of nearly two years in favour of the country. The mean duration of life was greater for females than for males, being for the females 39.1 years, and for the males only 35.5 years. In 1837, the estimated mean duration of life for the sexes bore the same relative proportions, being 46 years and 11 months for the females, and 41 years and 10 months for the males.

It is a curious fact, that, whilst the mean duration of life has been progressively increasing for the two last centuries, the number of individuals who have attained to an advanced age has been in the same proportion diminishing. Thus M. Mallet mentions, that, in the sixteenth century, it was quite a common occurrence to meet with individuals above a century old, but few or none such are now to be met with; and that there has not been in Geneva for the last twenty-seven years a single individual who has completed a century.

It would form the subject of curious inquiry to ascertain, if possible, whether there is any necessary connection between the increase of the mean duration of life, and the diminution of the number of extremely aged individuals. M. Mallet and also M. D'Espine think that an epoch may arrive for a people when the mean duration of life may increase without detriment to the occurrence of cases of longevity; but the reverse opinion has been held by other statistical inquirers, and data are yet wanting to enable any conclusions to be satisfactorily drawn.

The causes of death are divided into two heads,—those resulting from accidents, including suicides, and those from disease. 45 deaths were produced by the first of these causes, of which number 15 were from suicide, 9 from accidental drowning, and 21 from other accidents.

Of the 15 suicides, 13 occurred in the town, and 2 only in the country; 12 being males and 3 females. The previous year there were 20 cases of suicide, of which number, 17 were males, and 3 females. The number of suicides at the different periods of life, for the two last years, is given in the following table.

From 15 to 20 years,	3	From 50 to 60 years,	3
20 to 30,	9	60 to 70,	5
30 to 40,	7	70 to 80,	4
40 to 50,	4		

Of the 35 cases of suicide for the years 1837–38, death was produced

By drowning, in	10 Cases.
fire-arms,	8
cutting instruments,	5
poisoning,	4
precipitation from a height,	3
asphyxia,	1
not mentioned,	4

In the canton of Geneva, then, there occurs 1 suicide for every 3412 of the population; a number much greater than what is known to occur in any other country of which statistical details have been given, with the exception of towns, where, from various causes, the number of deaths from suicide always rises to a considerable amount. Thus in France it is calculated that there occurs 1 suicide for every 20,740 of the population, whilst in Paris alone there is 1 for every 2040. The same remark applies to Prussia, in which country there is 1 suicide for every 14,404 of the population; whilst at Berlin there is 1 for every 2941. The proportion of suicides, however, for the town of Geneva is much greater in proportion to its population than for any, even the most overgrown towns, being no less than 1 suicide for every 1866 of the population.

It is much to be regretted that M. D'Espine has not given some farther details with regard to those cases of suicide, viz. the profession, religious tenets, &c. as some very curious opinions have been lately advanced, tracing the connection between mental derangement and the religious and civil liberty of the people. Suicide being in almost every case the result of temporary mental derangement, the same argument would seem to apply to it as to insanity itself; and the fact of the large proportionate number of suicides to the population in the town of Geneva, goes far to prove the correctness of this supposition. Though surrounded by despotic governments on every side, Geneva is blessed with comparatively liberal and free institutions, and the minds of its inhabitants are not fettered either by civil or religious despotism. Are they on this account, it may be asked, more exposed to the exciting causes of insanity?

With regard to the deaths from disease, M. D'Espine has given lengthened details, and treated them in several subsidiary divisions which facilitate the inquiry. Thus his first class is entitled "accidental death produced by morbid causes;" a connecting link as it were between the deaths from accident and those from disease. Under this division are classed 118 deaths, of which the following is the abstract

Sudden death, .	10	Delirium tremens, .	3
Speedy death, .	5	Hematemesis, . .	3
Cerebral apoplexy,	58	Uterine hæmorrhage,	1
Pulmonary apoplexy,	3	Strangulated hernia,	4
Convulsions, .	25	Internal strangulation,	1

The above divisions do not appear to be well chosen or very scientific, nor do they fulfil the object intended. What, for instance, was the cause of the sudden deaths? Why is disease of the heart omitted, certainly one of the most common causes of sudden death; and the same also may be said of disease of the heart complicated with cerebral apoplexy.

Cerebral apoplexy was most fatal in the months of October, January, May, November, and March, and chiefly in those above the age of 60. Twenty-one cases occurred in males, and 37 in females. The cases of convulsions were chiefly in children under one year of age.

The next class of diseases which are enumerated are those commonly styled acute diseases. These M. D'Espine divides into two sub-classes. 1. Simple inflammations, as pneumonia, enteritis, &c.; and 2. specific inflammations, as typhus, scarlatina, measles, croup, &c. The mortality from acute diseases for the year 1838, was 353, of which number 143 belonged to the first subclass, and 210 to the second. The relative proportions for town and country show that simple inflammatory diseases are more prevalent in the country than in the town, whilst the specific inflammatory or febrile affections are most fatal amongst the crowded population of the town. Thus of the simple inflammatory diseases, 61 deaths occurred in the town and 82 in the country; whilst 107 deaths occurred in the town from the specific diseases, and 103 in the country. The specific inflammatory affections appear, from the annexed table, to be most fatal in early life, and, with the exception of the first year of life, their mortality gradually decreases with the advance of years. The reverse is nearly the case with the simple inflammatory affections, the mortality from them increasing with the advance of years; the first three years of life form an exception, however, to this statement, the mortality being very high, especially during the first year.

Ages.	No. of deaths. Simple inflammation.	No. of deaths. Specific inflammation.
From 0 to 1 year,	23	26
1 to 3	19	83
3 to 10	7	45
10 to 20,	6	22
20 to 30,	6	11
30 to 40,	6	11
40 to 50,	13	5
50 to 60,	18	3
60 to 70,	22	1
70 to 80,	20	2
80 to 90,	3	1
	143	210

Of the simple inflammatory diseases, no fewer than 60 deaths are attributed to pneumonia alone, whilst there are only three classed under pleurisy, and nine under pulmonary catarrh. As these are the only acute diseases of the lungs which are enumerated, it may reasonably be concluded that other acute affections of these organs are classed under pneumonia. Thirty-four deaths resulted from pneumonia in men, and only 29 in women. The mortality was greatest in those above 40 years of age, and in the months of May, January, March, and November.

The next greatest mortality among the simple inflammatory diseases is attributed to enteritis, 28 cases being referred to that head; whilst only 17 cases are classed under gastro-enteritis. The mortality from the other diseases referred to this head was, from cephalitis, 11; peritonitis, 8; hepatitis, 3; glandular inflammation, 2; and erysipelas, 2.

From the remarks which follow the above statement, it would appear that all acute affections of the bowels which were attended with purging were classed under the heads of enteritis and gastro-enteritis, such as diarrhœa, dysentery, and lienteria, and the affections of the bowels of children in particular. Hence it happens that nearly two-thirds of the mortality from these affections occurred in children below the age of three years; and it is a circumstance not a little curious, that, of the 45 cases of enteritis and gastro-enteritis, the chief mortality took place in the country; no fewer than 35 cases occurring in the country, but only 10 in the town. As the chief mortality was amongst infants, M. D'Espine very justly attributes it to the lesser care and attention bestowed on the management of children in the country than in the town.

The specific inflammatory diseases are ranged under the following heads, the numbers indicating the mortality resulting from each.

Acute hydrocephalus,	59
Croup,	16
Typhoid disease,	23
Hooping cough,	36
Measles,	37
Scarlatina,	15
Small-pox,	2
Consequences of delivery,	12
Pemphigus,	1
Pernicious intermittents,	1
Acute rheumatism,	2
Gangrene of mouth,	1
Gangrene of other parts,	3
Acute diseases of new-born children,	2

making a total of 210 deaths.

The cases of hydrocephalus were more fatal amongst females than males, 34 being females, and only 25 males, and the ages being chiefly under ten years. Season appeared to have little influence over the mortality from this disease; but the difference of a residence in the town and country was very marked,—34 cases proving fatal in the country, whilst only 25 occurred in the town.

February, March, and July were the months in which croup was most fatal; and the average age of its victims was 3 years.

The typhoid affections occurred in equal numbers for town and country; and the same remark applies to the sexes. The chief mortality occurred between the ages of 10 and 30. The seasons appeared to influence their mortality; February, November, and January being the months when its fatality was greatest, whilst not a single case occurred in the months of August and September. The average age of those who died of this complaint was 21 years, 6 months. This is very near the average of those who fall victims to the same disease at Paris. M. Louis, from his observations in the Hospital of La Charité at Paris, calculates the mean age at 23 years; but, as he makes no allowance for the cases which occur under 10 years, it is highly probable that, if thus corrected, the age would be the same as at Geneva.

Of the 36 deaths from hooping-cough, 23 occurred in the town, and 13 in the country; affecting an equal number of both sexes. The mortality was greatest in the month of August, and next greatest in the months of January, February, and March. Most deaths occurred in those between 1 and 2 years old, and then in those under 1 year. No deaths took place after the fifth year of age.

Of those affected with measles, 37 died, 22 in the town, and 15 in the country; of these, 14 were males, and 23 females; 18 deaths occurred in the month of June, 9 in May, 4 in July, 3 in April, 2 in August, and 1 in January. The average age of the victims of this disease was 6 years and 4–10ths. M. D'Espine remarks that in general measles has first appeared in the town of Geneva, and afterwards spread to the country; and that the disease for the year 1838 was regarded as mild, the general average of deaths being only 1 for every 40 who were attacked with the disease. It is also stated that pneumonia supervening on the attack of measles was the immediate cause of death in eight of the cases.

The mortality from scarlatina was too trifling to afford grounds for drawing any inference. Only 15 deaths were attributed to this disease, 5 of these taking place in October. 12 were males, and only three females; and the average age was two years and 9–10ths.

The deaths from the consequences of delivery were referred to puerperal fever and uterine hæmorrhage; and the proportion of deaths to the number of deliveries was as 1 to 130, and were equally spread over town and country. The age most obnoxious to the fatal result was from 35 to 40; 5 of the cases occurring at this period of life.

Chronic diseases produced a mortality to the amount of 550. These M. D'Espine divides into four groups or sub-classes; 1. Deaths produced by scrofulous diseases; 2. By tubercular disease; 3. By scirrhus or cancer; and 4. by chronic alterations of the tissues.

Twenty-one deaths occurred from scrofulous disease, viz. 15 from general scrofula; 5 from caries of the vertebræ; and 2 from caries of the joints and pelvis; 8 of the deaths were in males, and 13 in females; 12 took place in the town, and 9 in the country. September, January, and June were the most fatal months. The average age was 19 years and 3–10ths.

The mortality from the second sub-class, the tubercular diseases, amounted to 188; of which 155 were caused by pulmonary consumption, 14 by mesenteric tubercles, and 19 by chronic tubercular enteritis. 101 cases occurred in the town, and 87 in the country; the number of each sex being nearly equal. The average age at which death took place was 25 years and 9–10ths; but the average age of those who died of pulmonary consumption was 29 years.

The third sub-class, or scirrhus and cancer, produced 69 deaths, as follows—

Cancer of the mouth, -	1	Scirrhus of rectum, -	1
Scirrhus of œsophagus,	1	of liver, -	18
of stomach, -	35	of uterus, -	7
of intestine, -	1	of mamma, -	5

The mortality from these diseases was nearly equally distributed over town and country, but the proportion of females was much greater than that of males; there being 47 females and only 22 males. The average age at which death took place in consequence of these diseases was 57 years and 9–10ths.

The number of deaths produced by the fourth sub-class was 272, and was distributed in the following manner.

Chronic cerebral affection, . .	7 deaths.
Paralysis with mental derangement, .	5
Chronic disease of the spinal marrow, .	2

Paralysis, various forms,	14 deaths.
Paraplegia,	2
Chronic pulmonary catarrh,	59
Disease of the heart,	37
Hydrothorax,	51
Ascites,	9
Chronic enteritis,	21
Chronic disease of bladder,	9
Chronic ovarian disease,	1
General dropsy,	55
Total,	272

Of these, 113 were males, and 159 females; 103 cases occurred in the town, and 163 in the country; the average age at death was 63½ years; and the mortality was greatest in the months of January, February, March, and April.

M. D'Espine thinks that the mean age at which a chronic disease proves fatal ought to be regarded as one of its characteristic marks. Thus, says he, it appears that each class of chronic disease fixes itself with deadly grasp on one of the stages of human life, and this is so apparent with regard to some of them, that it is a known and undoubted fact that scarcely has man escaped from the age at which one variety of scrofulous disease is most fatal, before he is hurrying on to that at which he has to dread the invasion of another. In illustration of this remark, he notices the fact of the mean age of the mortality by scrofulous diseases being 19 years 3-10ths; the mean age at death from tubercular disease being only 6 years in advance of this, viz. 25 years and 7-10ths, and the mean age from scirrhous diseases being 57 years and 9-10ths. In order, however, to complete the chain which M. D'Espine has alluded to, it would be necessary to include the diseases of childhood, which have an evident connection with a scrofulous state of the body, as hydrocephalus, and the disorders of the bowels of children, depending, as these last do, in most cases, on chronic inflammation, and ulceration of the muciparous follicles of the bowels, and consequent enlargement of the mesenteric glands. Thus, according to MM. Cousture and Lombard, in the Hospital des Enfans Malades at Paris, it was found on dissection that of 214 cases of death, no fewer than 102 were affected with tubercular deposits, and the great majority of these children were under 7 years of age.

Scrofulous diseases are, in fact, the most deadly scourges of the human race; no period of life is exempt from their ravages; but it is in childhood and youth that their fatality is greatest. Before the 20th year of life, they have already cut off two-thirds of their victims.

In the canton of Geneva in 1838, 47 deaths were attributed to old age; 18 of these occurred in inhabitants of the town, and 29 in those of the country. The mean duration of life of these 47 cases was 81 years and 1-10th; that of the males being nearly 1 year higher than that of the females, Of this number, 26 were males, and 21 females. The greater mortality occurred in the months of January and June. It appears, then, that more males attain to an advanced age than females; and that a residence in the country is more favourable to a prolonged existence than that in a town.

The value of statistical details like the present cannot be doubted; but this report of the mortality of a canton of limited extent, shows how easily partial deductions may be drawn from facts confined to the short period of one year. The calculations as to the mean duration of life for the canton of Geneva may be adduced as a striking example of this. In the report for 1837, the mean duration of life was calculated at 44 years and 6 months, whereas the very next year it stood so low as 37 years and 4-10ths. It is only by taking the average of a considerable number of years, that any thing like approximative results can be obtained; and if the same care should be expended in the subsequent, as on this and the previous reports, a body of evidence will be collected calculated to form a valuable addition to the mass of facts collecting on all sides, relative to human statistics and mortality.

Art. II.—*Recherches sur l'Introduction Accidentelle de l'Air dans les Veines, &c.* Par. J. Z. Amussat. Paris, G. Bailliere. 1839, 8vo. pp. 250.—*Researches on the accidental Introduction of Air into the Veins; and especially on the Question, "Can air introduced spontaneously by a wounded vein during a surgical operation cause death suddenly?"* By J. Z. Amussat. Paris, 1839, 8vo. Pp. 250.

The fatal effects of forcing air into the blood-vessels of the animal body have been long known. The experiment of blowing or injecting air into the veins of animals is one now of considerable antiquity. But the circumstance of the spontaneous introduction of air into a wounded vein during an operation is a new fact.

The phenomena observed in the inspection of dead bodies led to the question, whether air could be developed in the blood-vessels during life, whether the presence of such a substance could cause death, and in what manner it did produce the result? This question occupied the attention of Redi, Wepfer, and Morgagni, and afterwards the elaborate experimental inquiries of Bichat and Nysten. At this time, that is, down to 1811, the period at which the experimental researches of Nysten appeared, it was known that a quantity of air injected or blown into the veins of any animal caused death in a very short space of time; and the method was commonly adopted in destroying diseased and unserviceable horses. But the possibility of death being suddenly produced by the accidental introduction of air into the veins in wounds, either in animals or in the human body, appears not to have been imagined. It was first in 1806, that the possibility of very alarming symptoms succeeding to such an accident became casually known to M. Verrier, Professor of Veterinary Surgery at the School at Alfort. A horse had been blooded by opening the jugular vein; and it was observed that in suspending the pressure on the open vessel, in order to stop the bleeding, a quantity of air got into the vein with a gurgling noise, sufficient to apprise the operator of what was going on, and to put him on his guard as to the future state of the animal. Convulsions, similar to those which follow insufflation into the jugular vein of an animal intended to be destroyed, speedily ensued. M. Verrier had instant recourse to blood-letting, which he repeated several times; and in a short time the animal recovered.

To this fact, which was recorded in the Proces-Verbal of the School for 1806, little or no attention was given at the time; and a long period elapsed before any similar accident seems to have made any decided impression on the minds of physiologists and surgeons. It was indeed only in the year 1818 that an accident took place in the course of an operation at the Hospital St Antoine, so striking, that it gave rise to speculation, and some three years after was published by Magendie in the first volume of the *Journale de Physiologie Experimentale.* (P. 190.)

Though this is the first authentic narrative of the occurrence, yet, as the same case was afterwards republished in 1829, we shall give an abridged account of it, as it was then placed before the profession.

1. E. F. Lemel, a locksmith, 23 years of age, had for five years a large tumour on the right shoulder and collar-bone. This tumour extended from behind forwards, from the spine of the scapula to the level of the upper margin of the second rib. It occupied transversely the middle part of the collar-bone; it was fixed to the spine of the scapula, to the acromion, and the external part of the collar-bone, but was moveable anteriorly, and on the ribs. This tumour, which was developed without known cause, was slow in progress, and was said to cause no pain, and not to interfere with the motions of the shoulder. But its bulk and the dread of its becoming larger obliged the patient to enter one of the Paris hospitals (St Antoine) to undergo an operation for its removal.

The surgeon, M. Beauchene, proceeded on the 14th July 1818, with prudence and dexterity, to the extirpation of the tumour, and was obliged to detach it, from before backwards, avoiding the great pectoral muscle and the first rib, behind which it sunk deep. In this first portion of the tumour were imbedded the three external fourths of the collar-bone, somewhat diseased.

The rest of the tumour was removed partly by the fingers, partly by the bistoury. The posterior portion, which extended into the supra-spinal fossa, was removed with difficulty, avoiding the Trapezius muscle, the external and superior margin of which, nevertheless, was injured. The *supra-spinatus* muscle was not touched. Part of the tumour which adhered to the scapulo-humeral articulation and the external part of the upper margin of the great pectoral muscle, was dissected and carefully removed. At the inner part it was cautiously detached from the *scaleni*. The internal end of the collar-bone, which was diseased, remained; but the articular part, which was sound, it was necessary to spare. The whole of the diseased part having been dissected and raised, and fixed by assistants, who protected the surrounding parts by their fingers, the bone was divided by means of a small saw. Hitherto the patient had lost but a small quantity of blood; he was not sensibly weakened; the pulse was full, regular, and strong; and the breathing easy. The sawed portion of bone was then turned outwards, and detached by means of a bistoury. All at once was heard a peculiar noise, quite similar to that made by air when entering by a small aperture the chest of a living animal. An assistant instantly placed his fingers on the upper part of the *pleura*, which was supposed to be opened in the portion which rises above the first rib, and the noise immediately ceased. During this time, which was very short, the patient said, "my blood is out of my heart (body according to the first report;) I am gone." He became pale; the head fell back; the eyes were fixed, and no longer distinguished objects; the breathing easy, but rattling, seemed to be performed by the left side of the chest alone; the right side seemed to perform only very feeble motions; the pulse was very small, frequent, hard and irregular; the body was covered with a cold sweat; and some convulsive motions took place.

Persuaded that air and blood had entered the cavity of the chest, a caoutchouc tube, flattened between the fingers of the surgeon, was slipped between those of the assistant who was stopping the aperture, and an attempt was made, by aspiring through this tube, to withdraw the air which was thought to have been introduced into the chest. Three inspirations were made; air was indeed withdrawn; but whether it proceeded from the chest, or from without, is and must be matter of doubt. A sponge, surrounded with lint covered with cerate, was cautiously applied in the place of the fingers of the assistant. During this change the same sound was again heard; but the short time allowed only a small quantity of fluid to reach the cavity. It was thought, from the difficulty which it seemed to have in entering, and from the vibrations of the borders of the aperture, that the wound was very small, and that, consequently, a great quantity of blood could not have been introduced into the chest, but that a sufficient quantity of air might prevent the dilatation of the lung.

The fainting-fit continued. Cold water thrown on the patient's face recalled him to life for some moments. The wound was then sponged; the largest vessels were tied; and a red-hot iron was passed over the surface, in order to destroy any remains of cancerous texture. It was then dressed, taking care to compress the sponge which covered the orifice. Meanwhile the general symptoms increased in intensity, and the patient was dead a quarter of an hour after the appearance of the unfavourable symptoms, and 45 minutes after the commencement of the operation, which lasted half an hour.

It is unnecessary to describe the nature of the tumour, which appears to have presented the usual characters of *encephaloma.*

The body, inspected 18 hours after death, disclosed the following appearances.

The left side of the chest contained a great quantity of reddish serous fluid; the right side less. The lungs were sound, crepitating, and filled completely the two sides of the chest. There was no effusion of blood and no opening in the right pleura.

The tumour was completely removed. The wound was formed anteriorly by the Trapezius, the *supra-spinatus*, the upper margin of the scapula, the lower part of the *scalenus posticus*, the omohyoideus, the cervical nerves forming the brachial plexus, the subclavian artery and vein, and the first rib. It was bounded within by the *scaleni* muscles and the cervical nerves; and without by the scapulo-humeral articulation.

At the anterior external part of the wound was the external jugular vein, which had been cut when the sawed portion of the collar-bone was detached. This vessel, elsewhere sound, had sustained a loss of substance one-inch in length, and about one-half of its calibre. The wound terminated immediately above the right subclavian vein, and was bounded below by the latter, so that if the incision had been prolonged a single line, the subclavian vein also must have been opened.

The superior *vena cava* contained no blood; its inner membrane was red. The pericardium contained serous fluid. The four chambers of the heart were quite void of blood; those of the left side appeared in the natural state; perhaps the ventricle was a little thickened; the right chambers were flabby, very thin, pale, and much larger than those of the opposite are.

The brain presented a tint generally gray; the little bloody points were very numerous and large. All the vessels large enough to be visible contained a great quantity of bells of air.

In the abdomen, the aorta, the crural arteries, the inferior *vena cava*, and the iliac veins contained blood mixed with bells of air.

M. Beauchene expected, on opening this body, to find the right side of the chest filled with air, and was surprised to find none. To what cause, then, was the death of the patient to be ascribed? Some thought it had been caused by hemorrhage; but this notion was at variance with the state of the vessels and of the muscles. Others ascribed the fatal event to pain. But considering the state of the jugular vein, its opening to the subclavian vein, which, being always distended with blood returning to the heart, prevented the walls of the former from collapsing, the sound heard at the moment of the death of this man, its cessation upon compressing the wound, and the air found in the vessels, M. Beauchene and M. Piedagnel did not hesitate to say that the cause of the death of Lemel was the admission of air into the heart. But as this was at variance with received opinions, this notion was resisted and treated with ridicule. Next day they communicated the case to M. Magendie, who gave an abstract of it in his memoir on Death produced by the entrance of air into the Veins, (Journal de Physiologie, 1. p. 190), as already mentioned.

The accident now mentioned occurring, as it did, in a public hospital, and taking place so unexpectedly, and in a manner so little understood, excited abundant notice and attention. Magendie, occupied as he was with the question of the absorbent powers and imbibing action of the veins, instantly perceived the important aid which it lent to that hypothesis, had no difficulty in explaining both its cause, and the mode in which its effects proved fatal, and, in short, recorded it as an unequivocal example of air being spontaneously drawn into the venous system by the peculiar mechanism of the veins in the neck, and their connection with the cavity of the right auricle of the heart.

To confirm his views more decidedly, and demonstrate the justness of his reasonings, M. Magendie attempted to produce the same phenomenon in animals, by placing them in similar circumstances.

He introduced, for instance, an elastic gum tube into the jugular vein of a dog, directing it towards the heart. Scarcely was it there when he heard air enter the vein, and the animal fainted with the peculiar rustling noise which denotes the presence of air in the heart. He instantly stopped the aperture in the tube, in order to prevent the entrance of more air, and the animal gradually returned to himself, because the quantity of air admitted was insufficient to kill him. He opened the tube: and immediately the air again rushed towards the heart, while its entrance was followed with the same phenomena. But whether he had not quickly enough restopped the tube, or more air had been introduced, the animal died unexpectedly. Upon dissecting the body he found all the marks of death by the sudden entrance of air into the venous system.

In illustration of the same general principles, he records in the same paper, an instance of very alarming effects following the accidental introduction of air into the jugular vein of a horse during the operation of blood-letting, by M. Bouley, junior, and in which the fatal event had been with some difficulty averted by removing the ligature and allowing blood to escape.

In the original publication of the above case by M. Magendie, neither the name of the patient, so unexpectedly cut off, nor that of the hospital in which the occurrence took place, nor that of the surgeon by whom the operation was performed, was mentioned. The singularity of the occurrence had perhaps appeared as a reason for withholding at that time these circumstances; and it was only eight years after when the same accident had taken place in the course of operations by other surgeons, Dupuytren, Delpech, and Castara, that a detailed account of the case, with all these circumstances, was published by M. Piedagnel in 1829 in the ninth volume of the same Journal.

The occurrence, and the circumstances under which it was liable to take place, in the meantime, gave rise to various articles in periodical publications, and discussions in societies. In 1835, M. Amussat, the author of the present essay, read, at the annual sitting of the Royal Academy of Medicine, a Memoir on Traumamatic Hemorrhages, in which he communicated his researches on the question. In 1836, M. Magendie made it the subject of a particular lecture, which is published in the first volume of his Lectures on the Physical Phenomena of Life. On the occasion abovementioned at the Royal Academy, in consequence of a case then communicated by M. Amussat, some doubt was thrown on the case, and several of the previous facts were denied. This led to a discussion, in which different individuals espoused different sides of the question, leaving as the general result the whole subject involved in a degree of doubt, uncertainty, and obscurity, very natural in such circumstances, but extremely perplexing to the physiologist and surgeon. It is chiefly with the view of dispelling some of this doubt and obscurity, and placing the question on a more solid and indisputable foundation, that M. Amussat has undertaken the publication of the present essay, containing a full investigation of all the facts.

The necessity of such an investigation will appear to be rather increased than diminished by two circumstances. The case of suicide and observations thereon, published by Dr Handyside in the 49th volume of this Journal, gave rise to some controversy, in which both the facts were doubted, and the justice of the inferences was questioned. With what propriety or justice this was done, it is unseasonable here to inquire. But while the case recorded by Dr Handyside receives, in the present essay, a place among the head of wounds of the dangerous region, the circumstance shows that the subject is still one which is under investigation, and open to discussion. Secondly, Sir Charles Bell read before the Royal Society of this city, on the 2d of March 1840, an Essay on the Fatal Effects of Air drawn into the Veins during Surgical Operations on the Neck and Shoulder, in which he proposed a new hypothesis for explaining the mode in which the air thus inspired produces its fatal effects. The justice of this hypothesis was opposed by another member; and Sir Charles Bell, at a subsequent meeting, on the 20th of April, adduced several additional facts in confirmation of the correctness of the views which he had proposed.

Whether the facts and arguments adduced by M. Amussat be sufficient to determine the doubtful, and elucidate the obscure points of this difficult question or not, we think every one must admit that he has investigated the subject in a very impartial and philosophical manner, and has placed its principal elements in an order so clear, that it will serve for an initial point in all future inquiries on the subject.

The treatise of M. Amussat consists of four parts.

The first contains a series of experiments on living animals, 1*st*, on the spontaneous introduction of air into the veins; and 2*d*, on the forced introduction of air into these vessels; and 3*d*, experimental researches on the means of preventing, arresting, or counteracting the effects of the introduction of air into the veins.

The second part consists of examples of the admission of air into the veins observed in man and in the lower animals. This the author subdivides into five heads; 1*st*, incontestible facts, or those in which the body was examined after death; 2*d*, incontestible facts, but without inspection after death; 3*d*, cases of admission of air into the veins in man and animals, in which recovery took place; 4*th*, doubtful facts; and 5*th*, instances of wounds of the dangerous region.

The third part is devoted to the explanation of the phenomena of the introduction of air into the veins; and the fourth part consists of practical deductions regarding the means to be employed in preventing the occurrence of the accident, or obviating its effects after it has taken place.

This method of arrangement may be very good. But it appears to us that it would have been more natural and not less useful had the second part, comprising the facts, as they have been observed and recorded in man and the lower animals, been placed first, and the first part second. This is the chronological order of the subject, and consequently follows that of information and inquiry, whether occasional and fortuitous, or the result of experiment and intentional research. This order, therefore, we adopt at present; and we resume the subject immediately after the case already recorded of M. Beauchene.

I. A. This division, corresponding to the second of M. Amussat, includes, as has been already said, all the incontestible or irrefragable facts; that is to say, all those in which the symptoms of the accident terminated fatally, and were more or less satisfactorily illustrated by the evidence of dissection of the body after death.

The next case which took place occurred in the practice of M. Dupuytren.

2. A young girl, named Alexandrine Poirier, entered the Hotel Dieu on the 19th November 1822, to be treated for a tumour at the posterior and lateral part of the neck. It began about ten months previously without known cause, and in the course of that time it had grown so much, that it then extended, from above downwards, from the mastoid process and external occipital protuberance, to the collar-bone and upper margin of the shoulder-blade, and from before backwards from the posterior border of the sterno-mastoid muscle, to beyond the median line of the posterior cervical region. Its shape was semiovoid; its anterior surface flat, rested on the posterior muscles of the neck; its posterior surface convex, was covered by the skin, the *platysma myoides*, a small portion of the *Trapezius*, a great number of nervous filaments issuing from the superficial cervical plexus; some arteries, branches of the superficial and deep cervical, and some veins, of which a large one was lodged in a sort of groove, and opened into the external jugular vein.

On the 22d November, the patient, previously prepared by a bath and a gentle purgative, descended into the theatre full of strength, courage, and hope. M. Dupuytren placed her on a seat with her face to the back; and having again satisfied himself of the mobility of the tumour, and of the number and importance of the parts to be divided, he began the operation by a crucial incision from above downwards, and from before backwards. The flaps were easily dissected backwards. Four or five minutes after the commencement of the operation, the tumour was raised by an assistant, who reversing it to either side, moved it from, and alternately approximated it, to the subjacent organs, and, attempting to turn it out, greatly facilitated the division of the cellular tissue connecting it to the deep-seated parts. The tumour was attached only to the anterior flap of the integuments; and the patient, who had lost little blood, as no vessels required ligature, bore well, and without complaint, the unavoidable pains of a minute dissection, when all at once was heard a prolonged hissing, analogous to that produced by the return of air into the exhausted receiver of an air-pump. The operator paused in astonishment, and said, " were we not far from the air-passages, it might be thought we had opened them." Scarcely had he finished speaking, and given the last cut to detach the tumour, when the patient cried, " I am gone," and was instantly seized with general shaking, then sank on the chair, and fell down motionless and lifeless.

All imaginable means were employed to restore the action of the heart. Cold water was sprinkled on the face and person; fresh air was admitted; M. Dupuytren blew air into the lungs, while the assistants rubbed the epigastric region and other parts, with their hands or cloths slipped in hartshorn; some drops of ether were poured into the mouth; the pituitary membrane was irritated by the vapour of hartshorn; tobacco-smoke was conveyed into the rectum and the nasal fossæ; and, in short, all the means known as remedies for syncope and for asphyxia, were employed almost simultaneously. All was unavailing. The patient was lifeless. Heat ceased first in the extremities, and then in the trunk.

The body, inspected twenty-four hours after death, disclosed the following appearances.

The pericardium was sound; the right auricle was distended by air, which rendered it loose and elastic; and when divided, the air escaped in large quantity without blood, a little only of which uncoagulated, was found in the cavity. Blood equally liquid was found in the other chambers of the heart, and in the arteries and veins of the body, of the limbs, and of the brain. There it was mixed with so much air that the vessels, when punctured, allowed bells mixed with blood to escape.

The pleuræ were smooth, thin, without serum; the lungs were red, elastic, crepitating, and quite sound; and the windpipe gave no trace of injury.

In removing the four flaps of the wound, it appeared that, with the exception of some fibres of the Trapezius, no muscle had been divided. The muscles of the posterior part of the neck were bare. No displacement of the vertebræ was observed in this region.

Though it was not positively ascertained by dissection, yet it is inferred that in this case, the large vein lodged in the hollow groove of the tumour, and communicating with the jugular vein, was necessarily opened, and, in consequence of its adherence to the groove, it was kept patent, and a vacuum must thus have been formed at the moment when the tumour was forcibly drawn outwards, and when the blood contained in this vessel was drawn inwards during inspiration; and hence the aspiration of the surrounding air, and the hissing sound heard. (Archives Gen., T. v. p. 430.)

3. The third incontestible fact occurred to M. Delpech.

A young man, 22 years of age, was admitted into the Hospital of St Eloi, at Montpellier, for hypertrophy of all the blood-vessels of the left arm, with ulceration of the back of the hand, and frequent profuse hemorrhages. To save life the arm was disarticulated at the shoulder joint. To prevent too rapid a gush of blood,—an accident most clearly to be dreaded, the operator took the precaution of reserving for the last stroke of the knife the cord of the vessels and nerves. All the vessels were enormously enlarged and discharged arterial blood; and it was necessary to tie arteries and veins indiscriminately. While the operator and his assistants were thus occupied, and the axillary vein was still free, a noise of suction, a strong hissing was heard very distinctly at several intervals by the most remote assistants. Every one imagined that the pleura might have been opened, so similar was the sound to that of the rushing of air into that membrane. The operator himself was satisfied that the thing was impossible. The vein was immediately tied, and with it all the accessary vessels which might be involved. The operation was happily completed; the ligatures beat forcibly; and the agitation indicated to every one the force of the circulation, when all at once the patient fell into a deep faint. Stimuli restored for one instant the exercise of the functions; but the next an acute shriek, a gurgling sound, and death took place.

The body was examined next day in public. The corpse was placed in a large tun under water; glass bells were held inverted and suspended to collect all the gaseous bodies which might escape. The pleuræ and pericardium were carefully opened; and nothing escaped. But the right auricle and ventricle of the heart, enormously distended, as also the two *venae cavae*, contained very little blood and large quantities of air; which were detached in the form of large bells which, collected and submitted to examination, were proved to be atmospheric air.

This elastic fluid, rarefied by the temperature of the blood, says Delpech, had manifestly prevented the latter from entering the cavities of the heart, and formed an insurmountable impediment to the circulation. (Memorial des Hopitaux du Midi, Avril 1830, n. xvi. p. 231.)

4. The fourth incontestible fact occurred to M. Castara, and is recorded by M. Saucerotte in a Dissertation defended before the Faculty of Strasbourg in 1828.

Adrian, a young man of 21, felt, in 1824, some painful constraint in the posterior region of the right shoulder, when labour became harder than usual; but it always disappeared after repose. A year after there appeared behind the shoulder, a small hard indolent tumour, without change in colour, stationary,—and inconvenient only in the motion of considerable elevation of the arm. This growth increased in size gradually, until, in the space of three or four months, it had acquired, in 1826, when M. Castara saw him, considerable bulk. He felt pulsations, irregular shakings in the right arm; but though the arm was smaller than that of the opposite side, the circulation in the limb did not appear to be disturbed. The tumour which was hemispherical, uniform, very hard, immovable, painful on pressure at several points of the surface, began to be the seat of acute shooting pains, and occupied the whole infra-spinal fossa without going beyond the spinal border of the lower angle of the scapula. It descended, however, a little beyond the external border, and, proceeding to the posterior part of the arm-pit, pushed forwards the *teres major* and *latissimus dorsi*, without forming adhesions with them.

There were no symptoms of fever, and the internal organs gave no indications of disease.

M. Castara undertook the operation of extirpation on the 18th

September 1826, aided by the physicians and surgeons of the hospital, and in the presence of several pupils. Two semilunar incisions in opposite directions proceeding from the spine of the scapula, and going to the lower angle of the bone, divided the integuments, leaving between them a portion two inches broad at the greatest diameter. The skin was quickly dissected from the tumour, which was situate before the fascia and the *infra-spinatus* and *teres minor* muscles, which were so thinned that they were not more than from half a line to one line thick. The first of these muscles was divided at the junction of its lower third with the middle third, parallel to the fibres, which were closely united to the morbid growth, consisting here of two lobes, unequal in size, joined by cellular tissue. These two portions, when separated by the finger, disclosed a deep cavity filled with reddish pulpy matter like softened brain; and the scapula was diseased. It was then deemed necessary to remove the large lobe and the adjacent soft parts, and facilitate the removal of the disease of the bone. The muscles being divided near their insertion, the tumour yielded to slight traction, and brought away many bony plates. But the attachment was firm on the side and border of the axillary artery where ended a scirrhous prolongation. The mass separated from the scapula was already removed; the division of the prolongation cautiously made was nearly over, when all at once was heard a peculiar sound, a sort of bubbling noise distinguished by several hurried clickings, which seemed to issue from the bottom of the wound. The parts raised were immediately replaced; but the patient had lost consciousness, the eyes were turned up, the face deadly pale, the pulse and breathing insensible. Analeptic means were actively employed in vain; two strong inspirations only were the last indications of life, which terminated without any convulsive motion.

The body, examined 24 hours after death, emitted no bad odour, and presented the following phenomena. The limbs were rigid. The wound was entire, the lungs and pericardium sound, and the heart of the usual size; the right auricle and ventricle were distended and elastic, and crepitated when touched. The auricle divided for some lines collapsed as well as the ventricle, and black blood mixed with bells of air escaped. The left ventricle and its auricle contained only a little dark-coloured blood mixed with some bells of air. The aorta and the arteries rising from the arch were empty, and it could not be ascertained whether they contained air. The superior cava, and right subclavian veins were filled with blood mixed with a considerable quantity of air bells. The blood of the inferior cava was without mixture of air.

In examining the wound, there was observed a venous branch of moderate size, which, going to the subscapular vein, was closely united to the pedicle of the tumour, and in raising this, the lower portion of the vein was raised so as to form an obtuse angle with the upper part adhering to the pedicle. Between the scirrhous prolongation and the apex of the angle formed by the vein there was seen on the posterior wall of the latter a small round opening, patent, at least one line in diameter, and in pressing the subclavian vein from before backwards, blood mixed with bells of air were made to escape. Through the walls of these veins the column of blood appeared, interrupted at intervals by bells of air, various in size, which were also observed to the bend of the elbow in the veins of the right arm. In the veins of the left superior extremity and those of the lower extremities no air was seen. Though peculiar circumstances prevented M. Castara from examining the brain, and making more extended researches, he saw enough to justify the conclusion that death took place speedily in consequence of the introduction of air into the heart, the functions of which were thereby immediately suspended.

5. The fifth incontestible case occurred to M. Roux.

On the 27th September 1832, a young woman, named Coragne, a sempstress, aged 18, of feeble constitution, was received into the Hospital de la Charité, for a strumous tumour, which she had carried for several years at the upper and lateral part of the neck. This tumour, which increased gradually every year, was as large as the head of a fœtus at the full time when presented to the examination of M. Roux.

As she was desirous to have it removed in consequence of its bulk, its weight, and the pain of which it was the seat, M. Roux determined on the operation. The usual incisions were made, the skin was reflected; adhesions were detached; and a few small arteries were tied. To facilitate removal of the tumour, M. Roux raised it with the left hand, and continued the dissection of its deep attachments. All at once was heard a peculiar noise, a sort of hissing analogous to the sound made by air when it first rushes into the exhausted receiver of the air-pump. At the same moment the patient uttered a plaintive shriek, was agitated in all directions on her bed with pain; the inspirations became long and painful; the respiratory muscles were contracted energetically; the beats of the heart were hurried; the arterial beats became feeble. A rattling noise was heard; the breathing was more and more suspirious; lastly, came a long inspiration followed by a short expiration, and all the apparent symptoms of death.

As the occurrence of these phenomena, M. Roux expressed his apprehension that a vein had been opened, and air admitted into its cavity. He compressed the open orifice by his fingers, caused the epigastric region to be rubbed, and threw cold water several times on the face of the patient; at the same time the nostrils were tickled by a feather dipped in hartshorn. After some minutes the beats of the heart were felt returning, the breathing sound was again heard; and the circulation soon restored life and motion to the body. The patient when interrogated stuttered and spoke in interrupted words, and sounds analogous to those made by patients labouring under palsy of the vocal organs. A considerable quantity of mucus escaped by the commissure of the lips; and the patient at length articulated and complained of pains.

M. Roux having applied ligatures to some vessels, did not choose to continue the operation; but strangled the tumour three-fourths dissected, by applying a double ligature and cutting off its supplies.

The patient when dressed was covered with warm bags, and got every hour alternately a spoonful of an ethereal mixture, and of Malaga wine. The second, third, and fourth days, not the slightest bad symptoms took place. On the sixth day the tumour exhaled a fetid odour; and it presented a putrid softened mass. It was easily removed and without pain to the patient. No accident ensued till the morning of the seventh day, when slight oppression and embarrassed speech took place, and were followed by coma and death during the night.

Inspection disclosed the following phenomena.

The wound was bounded below by the collar-bone, above by the mastoid region, within by the larynx and the sterno-hyoid and sterno-thyroid muscles, and without by the muscles of the hinder region of the neck. The tumour rested on the cellular sheath surrounding the common carotid artery, the internal jugular vein and the pneumogastric nerve.

The cellular sheath investing the vessels and nerves of the neck had been divided, and the internal jugular vein had been cut in its transverse diameter. The lower end of the open vessel was seen, and its walls already thickened and hypertrophied. A probe introduced within it went as far as the subclavian vein. The carotid artery and the pneumogastric nerve were untouched.

The lungs were crepitating; the bronchial ramifications of the right lung were filled with frothy serum. The left lung was less gorged, and presented emphysematous points beneath the pleura.

The cavities of the heart were empty; the aorta, thoracic and abdominal, punctured at intervals, gave issue to a considerable quantity of bells of air mixed with sanguinolent serous fluid. The iliac divisions presented the same phenomenon in less degree. The principal veins, the *venæ cavæ*, superior and inferior, and the concomitant veins opening into their cavity, presented nothing abnormal. (Journal Hebdomadaire, Tom. ii. p. 165.)

In this case the remarkable circumstance is the immediate recovery from all the inauspicious symptoms of apparently impending death, the patient continuing to do well for six days, and the fatal termination on the night between the seventh and eighth day. Such a result is rather at variance with the usually taught doctrines, on the mode in which the presence of air in the venous system proves fatal. If it proves fatal by overdistending the chambers of the heart, and thereby preventing their contraction, it ought to have done so at once. In other respects it is difficult to say what was the cause of death in this case; as the greater part of the air ought to have been absorbed as in the experiments of Nysten. It seems reasonable to think also, that when reaction took place and life was prolonged for seven days, the presence of air in the venous system ought to have induced inflammation of the inner coat of the veins. In point of fact, it is stated, that the walls of the lower portion of the internal jugular vein were already thickened and hypertrophied. But of any other effects of venous inflammation no mention is made.

6. The sixth incontestible fact is given by M. Ulrich of Berlin. In removing a tumour, situated on the side of the neck, and which compressed the vessels and nerves, M. Ulrich perceived that he had opened the internal jugular vein. Meanwhile no blood escaped; but the venous *parietes* remained apart as if they belonged to an artery. Their inner surface presented nothing peculiar; but externally they had a white colour, which is not common to veins. The assistants thought they heard a hissing sound at the moment when the vessel was divided. Very soon frothy blood escaped from the lower end; the patient fainted; he had slight convulsive motions of the face, then opisthotonos. The face was pale; the pulse small and tremulous; the respiration feeble; and death took place at the end of one minute.

The body at fifty-two hours after death gave no trace of putrefaction. The integuments of the cranium furnished fluid blood. The brain was firm and dotted. The carotid artery, internal jugular vein, and pneumogastric nerve were entire. The internal jugular vein was invested by the tumour. It was retracted and ended in obliteration a little above the point where it had been divided. The right auricle was found distended and elastic; and on making a small incision at its upper part, it immediately collapsed without a drop of blood escaping. The blood contained in the right ventricle and in the rest of the body was black and liquid.—(Gazette Med. de Berlin.)

In this case it seems impossible to doubt that air was drawn in or aspired into the vein by its lower division. The reason of the absence of hemorrhage at first is seen in the obliteration of the vessel by the pressure of the tumour above the point where the vessel was divided. But it is observed, immediately after came the hissing sound, the escape of frothy blood from the lower end where the vessel was pervious, and the characteristic symptoms, and the immediate cessation of life.

7. The seventh incontestible case occurred to M. Roux.

Halé, a dancing-master, 53 years of age, robust and corpulent, returned to his own residence on Sunday the 26th April 1836, in a complete state of intoxication. He was cold, and, approaching the chimney where he had just kindled a fire, he fell into it. He had much difficulty in extricating himself, and perhaps would not have succeeded without the aid of the neighbours, who ran to his screams. He could not tell how long he remained in the fire. He was brought the same day about 11 at night, to the Hotel Dieu, and placed in No. 4 of the Ward St Martha.

Examined next day at the visit, the face and trunk were seen to have suffered little. A few blisters were remarked on the anterior part of the belly.

The upper and lower extremities of the left side had also suffered little; on the left hand were two or three blisters; but the parts most injured were the extremities, and especially the arm of the right side.

The burning commenced two or three inches above the shoulder-joint, and extended to the hand. The inner surface of the arm and the palmar surface of the fore-arm were merely reddened; but on the outside, the burning penetrated to the muscles, all of which almost must have been injured. The skin was dry, horny, like parchment, brownish, black in some points, yellow in others. It was void of sensibility. The fingers had not been attacked by the flame; but such was the state of the parts above them, that if life was still conveyed to them, it could not be long; their size was increased; they were parted from each other, and could not be bent; they were of a violet livid colour; and insensible to external agents. At the thigh and leg the burning appeared to have proceeded to the fourth degree, affecting the whole substance of the skin, and it was confined to the fore part. By a happy chance, the region of the knee was only reddened; the foot had escaped and retained sensibility.

Amidst lesions so severe, there was no indication of internal disorder. The patient was void of fever, had no anxiety in his face. The countenance, however, looked stupid; the eyes were haggard; the answers were given with precipitancy; but these symptoms appeared not to be connected with the injury.

It was nevertheless clear to M. Roux, that this man, left to himself, was devoted to certain death. The burn of the arm alone was sufficient to destroy him. In these circumstances, M. Roux thought that separation of the dead arm was necessary to save the life of this man. The proposition was accordingly made, but refused. Tuesday, Wednesday, and Thursday, the patient persisted in refusing. Meanwhile fever was established, but not so marked on Friday as to contraindicate the operation, which was now requested by the patient in his turn. Disarticulation was indispensable, and M. Roux adopted the method of Desault.

The first incision, from the acromion to two inches below it, was made; the outer and posterior flap was cut; and the operator, after elevating it, divided the capsule, in order to luxate the head of the humerus, when he perceived the face of the patient grow pale as if he were about to faint, though he had lost only a few drops of blood. The symptoms appeared trifling; but M. Roux hastened to complete the operation. The path of the knife was made; then the capsule was divided to cut the anterior and internal flap, and before the large vessels were divided, an assistant had already slipped his hand behind the instrument to compress them on the flap, which was then quickly finished. But the fainting fit continued; two or three convulsive symptoms, gave rise to the idea that the patient was about to return to life; but, notwithstanding all the means employed in similar circumstances, cold water sprinkled on the face, the horizontal posture, spirituous frictions on the epigastric region, and stimulants of every kind presented to the nasal mucous membrane, the swoon continued, and it was no longer doubtful that the patient was dead. These symptoms appeared after section of the second flap. Some observers thought, seeing the patient perform certain convulsive motions of the arms and legs, with sudden flexion of the head, that he was to have an attack of apoplexy. Others nearer had heard very distinctly a hissing noise, similar to that of the admission of air into the exhausted receiver of the air pump. M. Roux himself heard something analogous, but thought he had the explanation in the motions given the articulation in order to divide the capsule. Lastly, most of the assistants, with their eyes fixed on the surgeon, had turned their attention to the patient only at the moment when the operation was suspended.

The body, inspected 24 hours after death, disclosed the following appearances.

The anterior wall of the chest and that of the belly were most cautiously raised. The pleura and pericardium were retained untouched; and the sternum was sawed near its *furca,* so as to avoid injuring veins of moderate size. When the pericardium was slit open, the right ventricle presented an unusual degree of softness and elasticity, which could be explained only by the presence of a gaseous body. In the coronary veins were seen globules of gas dividing in several points the column of liquid contained.

The *venae cava* inferior carefully dissected, gave the same sensation as the right ventricle. A portion was enclosed within two ligatures containing as much air as possible, cognizable still by the fingers; water was poured into this side of the abdomen, so as to form a little basin, the level of which rose at least one inch above the vein, which, divided by the knife, discharged at first blood reddening the water, then a quantity of air-bells. The mediastinum of the chest was in like manner converted into a basin filled with water, in the midst of which the heart was completely immersed. In this basin was inverted a glass jar filled with water, in which it was possible to collect, after dividing the right ventricle, eleven cubic centimetres, or 4.33 inches English, of air, which were preserved. Some bells were lost. No gas was found in the superficial or the deep-seated veins of the neck; and the right axillary and subclavian veins were filled with blood.

The left lung was quite bloodless, wonderfully light, crepitant, without any trace of emphysema. The right contained a little blood, but presented the same physical characters as the left.

Nothing unusual was seen in the abdominal organs. The cerebral portion of the arachnoid membrane was of an opaque dull tint. Much serous fluid was contained in the subjacent cellular tissue. At the anterior part of the right hemisphere was a flat calcareous concretion as large as a five-franc piece; some ecchymoses were seen in the cellular tissue separating the arachnoid membrane from the *dura mater*, and a small osseous process implanted in the vascular groove of the occipital bone.

The gas received into the glass jar was ascertained to consist entirely of atmospheric air. (Journal des Connaissances Medico-Chirurg., Sept. 1836.)

This case is peculiar in this circumstance, that the air must have entered by a vessel of very small diameter, as the accident took place during the formation of the posterior flap. It could scarcely have happened during the formation of the anterior flap, the previous compression of the axillary vessels preventing this as well as hemorrhage. This is more easily understood in the case of Delpech, in which the veins had undergone a morbid enlargement.

8. The eighth case is by M. Clemot.

In the extirpation of a tumour of the breast, weighing twelve pounds, an accident similar to that which occurred to M. Dupuytren and M. Graefe took place; but the patient did not die till some hours after the operation.

Upon inspection, the veins proceeding from the wound to the heart, and the ventricle and auricle were all distended with air.

9. The ninth incontestible case is contained in the dissertation of M. Putegnat, (Paris, 1834, p. 156).

A man attacked with apoplexy died immediately after the performance of a blood-letting from the jugular vein.

On opening the body, the right auricle of the heart was found distended with air.

The two last-mentioned facts are scarcely entitled to the character of incontestible. In the former, the patient did not expire with the rapidity observed in cases in which the veins receive air. In the latter, death might have taken place from the apoplectic seizure, or from fainting.

10. The tenth incontestible fact occurred to M. Bouley, junior, who communicated it to the Royal Academy of Medicine on the 29th January 1839.

On Monday the 21st January 1839, between noon and one o'clock, he went, as was his custom, to the establishment of M. Dareau, hirer of public carriages at Montrouge, to visit his sick horses. On his arrival, he learned from the chief equerry, that since his last visit, which was eight days previously, twelve horses, lame or diseased, had entered the infirmary. Though he was much pressed, and was not prepared for this increase of occupation, he began his visit with a gray mare, about 9 or 10 years old, which had been ill for four days. The constrained breathing, her complaints and cough, indicated the presence of pneumonia, which he concluded to be the more severe that the animal had not been blooded at the commencement. Auscultation showed that the right lung alone was diseased. As the redness of the visible mucous surfaces, and the hardness of the pulse, indicated the necessity of blood-letting, he performed it himself on the left jugular vein, according to the prescribed rules. The cutaneous aperture was large, and perfectly correspondent to that in the vein; the blood flowed freely by a continuous stream, and without jets; in short, every thing showed nothing but a favourable termination. Wishing to finish his visit as quickly as possible, he ordered the farrier to receive six pounds of blood in a vessel of known capacity; and he then went to visit other horses. At the end of about ten minutes, he was informed that the blood-letting was completed. He went instantly to the stall where his patient was, with the intention of introducing two setons in the breast, and he observed, that the farrier had neglected to stop the bleeding, which was still flowing; and he instantly repaired the omission by carrying a pin in the usual manner through the lips of the wound, and approximating them by a knot composed of some hairs. This was scarcely done when the most alarming symptoms appeared. The breathing became at once noisy, hurried, and most laborious; the nostrils were inordinately dilated; the pulse became imperceptible; general shaking of the whole body came on; the animal staggered, and very soon fell down as if struck by lightning, on the litter, when she expired a few seconds after, without the possibility of receiving any assistance.

M. Bouley asked the farrier if he heard any noise at the moment at which he compressed the vein. He answered that he had not; but as this man was stupid and often intoxicated, little reliance could be placed on his answers. After considering the state in which this animal was before blood-letting, the circumstances succeeding the operation, and the symptoms present at the moment of death, M. Bouley was disposed to ascribe the accident to the introduction of air into the jugular veins. Desirous to ascertain this by immediate inspection, he was, however, compelled by circumstances to defer the examination till next day. This done, 22 hours after death, disclosed the following appearances.

The left jugular vein in which the blood-letting was performed, opened unintentionally by the dissector at his entrance into the thoracic cavity, discharged with blood a considerable number of large air-bells. Nothing else was observed on that side. On opening the chest, which was done with the greatest care, there was observed within the right pleura and in the pericardium, a small quantity of bloody serum. Neither of the lungs was emphysematous. The left was sound; the right hepatized in almost its whole extent; and the hepatization, which was yellowish gray in colour, presented the appearance of a fibrinous deposit; but without any purulent matter. The heart was natural in size. The right auricle and ventricle were distended by a blackish clot, fibrinous in the centre, of considerable size, and extending into the two *venae cavae*, especially the anterior or thoracic. This clot was traversed by a numberless quantity of very small globules of air, part of which escaped with the blood, which continued liquid. The walls of the auricle and ventricle, the fleshy pillars, and the valves were also covered with a considerable quantity of transparent globules. The pulmonary artery, traced into both lungs to its smallest ramifications, presented liquid and very frothy blood. The left cavities of the heart presented the same appearances as the right. The clot which they contained, and which was prolonged into the abdominal aorta, was smaller, redder, and more consistent. The number of globules was in general smaller.

It was important to ascertain whether the air thus introduced into the vascular system had traversed the whole circle.

The blood contained in considerable quantity in the abdominal *vena cava* was also mixed with some globules; and many were observed in the mesenteric veins. These globules in the vessels now mentioned were interposed between columns of blood, and could be made to move with them by compressing the veins in which they were contained. The blood of the portal was also mixed with air even in the divisions distributed into the liver; pressure made on which forced black blood with globules of air out of the branches of the vessel. Many globules of air also were seen and made to move through the veins of the membranes of the brain. Many globules were observed in the veins of the *corpora striata*.

From all these facts, M. Bouley thinks that he is justified in drawing the conclusion, that the death of this mare was occasioned by the introduction of air into the left jugular vein. In this conclusion, M. Amussat joins, and adds, that the suddenness of the death was the result partly of the feebleness induced by the pneumonic attack, and the blood-letting performed with the view of curing it.

This case concludes the first series, or those in which the symptoms during life developed immediately during operation, and the facts afforded by examination after death, were conceived so unequivocal, as to entitle them to be regarded as incontestibly produced by the admission of air into the veins, and by no other cause.

From all these facts, it appears that the phenomena produced are peculiar in character, so that they are not easily confounded with or mistaken for other cases; that they take place with remarkable rapidity; and that they leave characteristic traces of their effects in the dead body.

The first circumstance observed, or rather heard, is a hissing sound, exactly similar to that made by air rushing into the exhausted receiver of the air-pump. This is manifestly produced by the pressure of the atmospheric air impelling itself through the newly made aperture in the vein. The second circumstance is in general a clicking or guggling rattle, a sound similar to that produced by the emptying of a narrow-necked bottle, and which is occasioned by the mixture of air with liquid on the entrance of the former, and the exit of the latter. This is produced by the admixture of the air with the blood in the vein, especially the superior cava, and perhaps the right auricle. In general when this sound is heard, blood at the same time escapes from the vein; and as this is frothy, it affords unquestionable evidence that air has been mixed with it in the vein.

It is to be observed also, that it is always either after the operation has continued some time, or at the close of great operations, when the patients are fatigued and exhausted, and have in the efforts been holding their breath, as is vulgarly said, that is, have been either breathing little, so as to fix the chest, or have been taking very short inspirations; and then all at once, to supply the deficiency, they have taken one or two deep inspirations, that this dreadful accident has taken place.

Next to the hissing sound, the guggling noisé and the escape of frothy blood, follow the convulsions of the sufferers; and here nothing can be so instantaneous. The moment the air reaches the right chamber of the heart, especially the ventricle, the patient feels as if he were at once dead, as if his blood ceased to flow, and life had left him. The first and the last act is in general the scream from the consciousness of the feeling. Sometimes the patient utters articulate words expressive of his sensations; more frequently it is an inarticulate shriek, expressive of the greatest agony, and the feeling of the sudden transition from life to death. In two cases only of the ten recorded under the present head did the patients speak. Their words were few and short, but frightfully expressive.

After this in general complete unconciousness and insensibility follow; and, indeed, in the majority of cases, the patient, though he may make a few convulsive gasps, is irrecoverably gone. In a few cases, a little rattling in the chest takes place, accompanied with one or two languid gasping attempts at inspiration, (Cases 4th, 5th), and in general this seems attributable to the mingling of air with the blood of the pulmonary artery; but this is not very common, as death is in general immediate and complete.

These cases are also sufficient to show that the admission of air into the veins is a mode of death peculiar and characteristic. However similar it is to syncope or fainting in the first instance, it differs from it in a variety of respects. In ordinary syncope the phenomena are gradual; it is an instantaneous suspension of all the functions; it is an apparent death. In death by introduction of air into the heart, intelligence is not at first affected; the disorder comes not from above, but from below, as a patient expressed it. In other words, in fainting the want of circulation is felt first in the brain, the vessels of which are first empty, and then in other parts; but in the case of admission of air into the vein, the disorder commences in the right side of the heart and in the lungs. Hence the accident appears partly like syncope, partly like asphyxia, but differs from both, and has certain peculiar characters.

In one case detailed by M. Amussat under the third head, the patient suffered both accidents; first, the admission of air, and seven days after syncope; and in this case the two orders of phenomena were totally different.

Before it was learnt that the accidental introduction of air into the veins, might be a cause of sudden death during operations, death taking place in such circumstances was ascribed to syncope, to hemorrhage, and to pain. It appears, nevertheless, more probable that, in analogous cases, most generally it is the accident here described, but which had been mistaken and overlooked. This is so much the more likely, that since the possibility of this accident has been established, few or no instances of sudden death by panic, by spasm, and similar causes have been noticed.

The lesions found in the dead body are, with the peculiar symptoms developed during life, and the mode in which they are developed, quite conclusive in establishing the nature of the kind of death. The presence of air in the veins and in the right chambers of the heart, after sudden death from operations or wounds in the neck, may always be sufficient to remove all doubts on the point. If it be argued that the presence of air in these cavities might be the effect of decomposition, then it must be answered, that it ought to be found equally and uniformly in every part of the body, and not in largest quantity, as it invariably is, in the right chambers of the heart.

These effects also, M. Amussat argues, are not so transitory and fleeting as might be imagined. They are observed a long time after death, as he has proved by direct experiments. These effects, produced by introducing air experimentally in the veins of animals, are altogether similar to those which have been observed to follow its accidental introduction in the human body, and in horses, in the course of operations.

B. The second class of facts collected by M. Amussat consists of those cases which he regards as incontestible, but in which no dissection had taken place after death, and which, consequently, want this sort of verifying evidence. Of these he has collected six, our account of which must be short.

The first and most remarkable case is by M. Mirault of Angers, and the details of which are given in the dissertation of M. Gueretin, defended at Paris in July 1837. The facts are as follows.

M. Mirault was removing, from a man of about 50 years, a large fibrous and glandular tumour, situate on the right side of the neck. The operation lasted about one hour. The patient had lost about twelve ounces of blood, notwithstanding numerous ligatures which it had been requisite to apply. He did not appear sensibly weakened, and, seated on a chair, bore the operation with courage. At he moment when the operator, after raising the tumour, dissected it very attentively, to separate it from the numerous subjacent organs, to which it adhered, in a manner so intimately that it appeared to make one body with them, there was heard all at once a very distinct hissing or sort of prolonged snuffling noise. M. Mirault instantly placed his finger on the part where he had cut with the bistoury. The patient, interrogated if he felt anything, answered in the negative. A quarter of a minute after, the operator, removing his finger to seek and tie the open vein, the same noise was distinctly renewed at two intervals, which corresponded with the actions of inspiration. The patient had been recommended meanwhile to suspend breathing. Immediately the face became pale. Two long inspirations followed; general trembling ensued, accompanied with tetanic convulsions. M. Mirault immediately replaced his finger on the vein, while the patient was placed in the horizontal position. Notwithstanding the most accurate pressure, the wound was overflowed with dark-coloured blood. The patient had ceased to breathe. The operator speedily seized the divided vessel, notwithstanding the torrent of black blood by which the wound was covered, and enclosed it in a ligature by means of a curved needle. The vessel was the internal jugular vein, which was opened in more than half its calibre, one inch and a half above the collar-bone. The blood ceased to flow immediately after the application of the ligature. About one minute and a half had elapsed after the appearance of the symptoms, during which cold water was sprinkled on the face, and the epigastric region was rubbed, while the patient was kept in the horizontal position, and he began gradually to breathe and move; in five minutes more consciousness and voice returned; and the pulse recovered its rhythm and fulness. After eight minutes of repose, the patient completely recovered, willingly allowed the operation to be finished. He answered questions, breathed freely, and appeared to have no tendency to faintness, unless for a moment when the head was raised above the horizontal plane. The pulse again became feeble though regular. The mass was entirely removed; a temporary dressing was applied. Eight ounces of blood had been lost since the accident. The patient, retaining the horizontal position, was placed in bed; the voice was feeble; and the breathing a little constrained. Intense general shiverings speedily followed and continued. M. Mirault saw no change take place for one hour, during which he remained with the patient. Wine and a draught were rejected by vomiting. M. Mirault went away for two hours, at the end of which he was hurriedly summoned. The patient who had continued in the same state told him that he felt all at once very ill. M. Mirault, indeed, found him with all the symptoms of suffocation; violet-coloured face, cold extremities, insensible pulse, a few very laborious inspirations, and saw him expire at the end of ten minutes.

The body was not inspected.

2. The second case is one from Dr Warren, and has been already published in this Journal, Vol. xlviii. p. 552.

3. The third instance of this accident without dissection occurred to M. Goulard of Lyons. (Gazette Med. 1833, No. 76.)

A female, aged 68, attacked with cancer of the breast, complicated with melanosis, which was seated in the cellular tissue in the hollow of the arm-pit, enclosing two large indurated glands, applied to M. Goulard of Lyons, who, yielding to the importunate solicitations of the patient, assembled several of his professional brethren to be present at the operation. The operation was begun with great care. In the dissection of the melanotic mass, and the glands near the arm-pit, the edge of the bistoury wounded a vein, it was supposed the axillary, from which a little blood flowed. At the same moment, the patient grew pale; convulsions of the face and trunk ensued; hiccup and death followed in a few minutes. All the means of compression and other means were employed to recover the patient, but in vain. The body was not inspected.

4. The next case is recorded by Dr Barlow of Blackburn, in the Gazette Medicale, 1831, in No. 42, and need not be here republished.

5. The fifth case is related by M. Duportail.

M. Dupuytren, in the presence of M. Duportail, extirpated, about eighteen years previous to the date of publication, in a female of 37 or 38 years, a tumour situate under the left arm-pit, as large as half an egg. At the close of the operation, the patient said she felt ill; stretched herself, turned up the eyes, became pale, and died in a few seconds.

This was thought at the time to be a case of mortal spasm. But Dupuytren thought a long time with his hand on his forehead, and then said before going out, that he thought this death must be ascribed to air introduced into the veins, though no one heard the sound.

6. The sixth case, if it proves anything at all, affords rather a striking example of the danger of experimenting and tampering with the vessels of the human body.

A surgeon who had tried in vain to draw blood from the veins of the extremities in a patient labouring under cholera, opened the jugular vein with as little success. He then thought of introducing a tube through the opening made in the vein of the neck. Scarcely had the tube reached the heart, when the patient uttered a shriek, and died. The surgeon ascribed instant death in this case to the introduction of air into the heart.

The facts recorded under this second head are certainly less conclusive than those given under the former, in not having the evidence of dissection to confirm them. So far, however, as they go, and taken along with the others, they must be allowed to confirm the general accuracy of the inference, that air admitted by any of the veins of the neck during inspiration speedily puts a stop to the motion of the heart.

C.—The third division consists of cases in which there was reason to believe the admission of air into the veins took place, but in which, nevertheless, from various causes, the fatal event did not follow. Under this head M. Amussat has collected fourteen cases. These we do not think it necessary to detail so fully as those of the two former divisions. But a few we shall mention.

1. The first is by Dr Warren, and has already been given in the forty-eighth volume of this Journal, (p. 553) and need not be again reproduced.

The next two cases are by M. Clemot.

2. In one, during the dissection of a tumour in the arm-pit, there was heard a sound similar to the hissing noise on aspiration; and the assistants thought that the chest was opened. The patient fainted. Terrified at the accident, the assistants withdrew, and left M. Clemot alone with the patient, who recovered after some minutes. M. Clemot tied the vein.

3. In tying the subclavian artery, on opening a small vein, a noise of aspiration, feeble but distinct, was heard. M. Clemot placed his finger on the vein, and the noise ceased. On withdrawing the finger, the aspiration and noise were repeated; and they ceased, and were renewed several times. The ligature was applied, and no accident followed.

4. In an operation performed by Dr Mott for the removal of a scirrhous parotid gland, he opened the facial vein at the point where it passes over the base of the lower jaw, at the beginning of the operation, before any artery was tried, and when he was dissecting the skin from the tumour, at the instant when the vessel was opened, the attention of all was struck by a sound of gurgling similar to that produced by air passing through a small aperture.

At the same time, the breathing of the patient became difficult and laborious; the heart beat violently and irregularly; the features of the patient were contorted, and the whole body was instantly attacked with convulsions so violent, that it was impossible to keep him on the table. In this state he remained on the floor for about half an hour in the greatest danger. Meanwhile the convulsions gradually ceased; the mouth remained turned to the side; and complete hemiplegia ensued. An hour and more elapsed before the patient could articulate; and a whole day before he had recovered the use of the arm and leg.

The conviction which all the spectators entertained, that these effects depended on the admission of air into the blood-vessels, recalled to the remembrance of Dr Mott a series of experiments which he had performed twenty years before in dogs, in which he introduced air into the vascular system, by carrying the extremity of a blow-pipe into a large superficial vein of the thigh, in which the results were identical.

Eight other cases follow; but we can admit only two of them, one which occurred to the author, and one which occurred to M. Mayor of Lausanne, which is in several points deserving of attention.

Of the case which occurred to M. Amussat, who communicated it to the Academy on the 4th July 1837, the following are the circumstances.

9. Madame Brunet, de Lagny, 47 years of age, strong, and habi-

tually enjoying good health, perceived, in 1835, on the right breast, a hard painful tumour, developed without cause, and to which she gave no attention. In the course of one year, the increasing progress of this tumour and the lancinating pains of which it was the seat, determined Madame Brunet to obtain advice; but all the treatment recommended was unsuccessful. She came to Paris and consulted several surgeons, whose opinions were divided between operation and temporizing. The last decision prevailed in the meantime; and methodic compression was adopted under the care of M. Canquoin.

In June 1837, M. Amussat, being requested by this gentleman to see her, he recommended immediate operation as the only chance of safety; and the operation was accordingly performed on the 1st of July.

The tumour was removed in the usual mode; and afterwards M. Amussat cut away by the bistoury and the scissors, a great quantity of degenerated tissues. The operation lasted more than half an hour, as it was requisite to denude almost the whole right side of the chest; and the operator followed the remains of the disease, which were continued on the opposite side, when, on cutting within and below the left collar-bone, an agglomeration of suspected glands, he heard a distinct and interrupted sound of air, which is introduced at the same time as liquid by a narrow aperture. M. Amussat thought at first he had opened the chest. All at once the patient, who had till then borne the operation with great courage, and had not lost much blood, complained of unutterable uneasiness, felt a sensation of suffocation, grew pale, and said she was going to die.

A little after this noise, which was heard by three of the spectators, the same phenomenon was repeated; and then, as all doubts were removed as to the nature of the accident, M. Amussat speedily placed his finger on the spot whence the sound issued. At this moment, the patient several times said, "I am going,—I am sure that I am dying." Her pale face was covered with a cold sweat; her eyes were turned strongly upwards; and every one imagined that she was expiring. Convinced both by the sound and the symptoms, that air had been introduced into the heart by an open vein, M. Amussat employed every effort to drive it out by favouring expiration, by compressing the chest, leaving the opening in the vein free, and then closing it by the hand of an assistant. Gradually the patient recovered consciousness; her anguish diminished; and M. Amussat concluded the operation by extracting two or three large glands, evidently degenerated, which were contiguous to the brachial plexus and the axillary vessels. Several arteries were twisted; and then he placed, by the aid of a curved needle and thread, a ligature on a plug of fat round the point, where was the vein which had given admission to the air. The wound was dressed, and the patient, who was very weak, was left in the bed on which the operation had been performed. She improved daily, and on the 15th of August, her health was good, and the wound was two-thirds healed.

To questions put immediately after the cessation of the accident on her feelings, and whether it was a faint, this patient answered in the negative;—that she had fainted several times after blood-lettings for instance, and that in the fainting fit, the complaint came from above, while in this she felt it come from below. Some days after, when she was again interrogated, she said that she had not lost consciousness, and that she remembered well what was going on; she answered " it was at the moment when you cut something, that I felt all at once that I was going; I felt great uneasiness; I felt my chest contracted, a constraint, a degree of anguish,—something in short choaking me."

12. Jane Clerc, a married woman, aged 38, in very good health, observed in the early part of 1838, at the right lateral region of the neck, a tumour like a nut, which then grew rapidly. In the course of nine months, it became the seat of lancinating pains, grew red, and formed several openings, which discharged serous purulent matter, and were covered with fungous growths.

On the 11th of February 1839, this woman entered the Canton Hospital, for the removal of this tumour, which was daily becoming more formidable. It was then a mass, irregularly hard, three inches long, and two and one-fourth broad, and was situate in the course of, and behind the sterno-mastoid muscle, which itself was involved in the degeneration.

The operation was performed on the 14th of February 1839, in the following manner.

After the usual preliminary incisions, M. Mayor fixed towards the confines of the tumour, and a little within the sterno-mastoid muscle, two hooks, with two and three claws, little curved, and very short. By means of these, he drew outwards the muscle, with the view of separating the tumour from the neighbouring parts and stretching the textures which connected it to the adjoining regions. Dr Recordon, who assisted, while M. Mayor was drawing out the parts, cut the adhesion so stretched, according as he could do so without danger.

When M. Mayor thought he had thus sufficiently separated whatever might cover and conceal the large vascular and nervous trunks or their dangerous vicinity, he cut the muscle across near its upper attachment, and dissected it behind, as also the morbid texture composing the growth. But at the moment at which he made the last incision, the snorting sound indicating the entrance of air into a vein issued from the end of the instrument, and was heard by all present. The patient instantly ceased to breathe, and gave no sign of life. One of the assistants compared the sound to a rattle; another to the sound produced by the reed of a hautbois; a third to what occurs when a funnel is emptied in a cask; and M. Pellis compared it to the gurgling sound of a narrow-necked bottle when emptying itself.

The usual means for the removal of syncope were adopted. But these feeble means would have been ineffectual, and sudden death would have been completed, had not M. Mayor, almost as quickly as the ominous sound was heard, placed the thumb of the left hand upon the spot whence issued the venous blood, and at the same time made quick, strong, and jerking pressure upon the lower third of the sternum. At the third or fourth of these prompt operations also, the patient all at once recovered consciousness and respiration quite natural; so that she returned from death to life with the same rapidity with which she had passed from life to death.

M. Mayor continued the pressure with the thumb, until every suspected texture was eradicated, and the flaps were arranged as well as possible. He then substituted accurately for the thumb a large moistened sponge, which was pressed strongly, and when he was satisfied that all bleeding was stopped, he dressed the sides with carded cotton, and fixed the whole by suitable bandages. This dressing was retained for three days, after which ordinary dressings were used. Nothing particular retarded the cure, which was completed on the 17th of March 1839.

M. Amussat willingly admits that the last series of facts leave many points wanting. The symptoms certainly resemble closely the usual effects of the introduction of air into the venous system. In general, the same sounds were heard, the same instantaneous effects in the circumstances of loss of consciousness and cessation of circulation ensued. The peculiarity consists in these cases recovering; and curiosity naturally suggests the question, What are the circumstances which, in these cases, favoured recovery and counteracted the unfavourable termination. In different cases, these circumstances appear to have been different. In some cases, as in one of those by M. Clemot, in that by Dr Warren, in the case by Dr Mott, it appears to have been the small size of the vein, and its being not directly connected with the superior cava and right auricle. In other cases, it appears to have been the small quantity of air admitted that facilitated recovery; and in the last case, as already given by M. Mayor, that gentleman attaches great importance not only to the rapidity with which he stopped the aperture in the vein, but to the forcible, sudden, and jerking pressure which he made on the lower third of the sternum, and which he believed had the effect of preventing the air from getting into the heart.

D. The fourth division of this part consists of doubtful facts of two orders; 1. Doubtful facts posterior to the discovery of the possibility of the spontaneous introduction of air into the veins; and 2. Doubtful facts anterior to the discovery of the possibility of the spontaneous introduction of air into the veins. Upon neither of these is it requisite for us to bestow any time.

E. The fifth division of this head consists of instances of wounds of the dangerous region. Several regions in the human body may be denominated dangerous when wounded; but the part, which is particularly meant as dangerous in this sense, is the lower region of the neck and the upper region of the chest, wounds in which, by opening the veins at their entrance into the chest, where the venous blood is under the influence of the motion of respiration, and where there is more or less firm attachment to the neighbouring parts, preventing them from collapsing, and where they communicate directly with the superior cava, are very likely to be followed by the introduction of air into the veins. M. Amussat is of opinion that it is very probable that in some cases of wounds of this region, especially when the wounded have lost little blood, death was occasioned rather by the entrance of air than by the exit of blood.

The facts of this class may be distinguished into two orders, one of involuntary wounds, and the other of voluntary wounds.

The recorded facts of this class are not numerous, though it is very likely that the casualties of warfare must have produced a considerable number of instances; and Baron Larrey appears to have observed examples of soldiers evidently destroyed by this cause. Only two cases are given by M. Amussat, both suicides. The first is the case published by Dr Handyside in the forty-ninth volume of this Journal. The second is a case of suicide also, which occurred to M. Pellis of Lausanne. As the latter case is little known, and tends to confirm the facts of the former, it is right to give a short sketch of its leading circumstances.

On the 7th of October 1839, at seven in the morning, M. Pellis was requested to visit M. D. of the canton of Vaux, who had immediately before attempted to put a period to his existence. M. Pellis found the patient sitting on a chair, with the head inclined to the left, and supported by one of his friends; before him, a vessel, which he had placed to receive the blood, the floor also covered with blood, and a bloody razor was lying on the night-table. Two steps from the wounded man, there were written on the floor in letters of blood, *Vivent la France et la Suisse.* In the right infra-hyoid region, a deep transverse wound, the edges of which were much separated. Blood was flowing by several small arteries, and above all by the external jugular vein, which was extensively opened, and in which was distinguished at intervals the reflux of the blood. M. Pellis immediately placed the head inclined towards the right to close the wound, then brought the chair on which the patient was placed near the window. The pulse, though feeble, was distinct.

Upon inquiring into the circumstances of this suicide, he found that for several days M. D. had been in deep melancholy. He courted solitude; but he was kept in sight, because his state gave rise to apprehensions so much the more serious, that some years before he had attempted self-destruction. On the 7th of October, he eluded the vigilance of his keepers, and cut his throat. The hemorrhage caused at first a half-faintness, but not enough to make him fall. Shortly after his strength returned, and then M. D. traced the words found on the floor. Sarcely had he finished writing, when some one entered the chamber. M. D. desired this person to withdraw; was even about to use force to compel him to do so; but was quickly seized, and placed in the chair, where M. Pellis found him immediately before this; while the messengers were away for M. Pellis, he fainted a second time; and he was beginning to revive, when M. Pellis arrived. He said he liked the fresh air. While M. Pellis was making the necessary preparations for dressing the wound, M. D. moved the head backwards, and at the same time made a strong inspiration. At the same moment, a guggling sound took place in the wound, and was heard all over the apartment, and the wounded man was instantly dead.

M. Pellis was allowed only to examine the heart. Having slit open the pericardium, and gently raised the heart, he passed behind it a ligature, and tied the vessels, and cut them across beyond the ligature. The heart thus detached was placed in a vessel of water, of the capacity of about three *litres*, that is, six English wine pints and one third. It floated very lightly. Fixing it by the hand to the bottom of the vessel, he made a puncture in the right ventricle by a bistoury; and immediately air-bells were extricated in large quantity, and were collected in a glass jar. When no more bells were disengaged, the heart was let go, and again ascended to the surface. It was again carried to the bottom of the water, and the left ventricle was divided, when more air-bells escaped, but in smaller quantity, than from the right ventricle. The heart then remained at the bottom. The air was sufficient to fill a glass-jar of one inch and two lines in diameter, to the extent of two inches and three lines.

This case is in many respects very important, as illustrating the fact of the admission of air into the veins, in wounds of the dangerous region. It must nevertheless be admitted, that, though this fact cannot in candour be denied, yet the vessels divided and the quantity of blood lost, as well as the circumstance of two fainting fits taking place, show that hemorrhage had contributed in no small degree to the fatal event. On the other hand, it cannot be denied, that air was drawn in to the jugular vein, and may have been the immediate circumstance which terminated all vital action. With this admission, however, which is demanded by the facts, and especially that of the presence of air in the heart, it is necessary to observe that, in the state of the system, more especially the state of the heart, induced by hemorrhage, deep and full inspirations are almost a necessary consequence. In all cases of syncope, either partial or complete, the motion of the heart does not return to its natural state, until after one or two or more long drawn deep inspirations, and always a deep long drawn inspiration takes place in complete faintness, as the first indication of the return of consciousness and the renewal of the action of the heart. This admission certainly does not invalidate the strength or the conclusiveness of the inferences deduced by M. Amussat, as to air being admitted or not, into the veins in this class of cases, nor as to the conclusion that death was the immediate or direct result of the admission of air into the superior *cava*. It merely shows that, under the circumstance of wounds in the neck, whether in the course of operation or accident, after some blood has been lost, deep or long drawn inspirations are almost inevitable; and hence, if a vein be opened, the effect of such long drawn or deep inspiration is equally inevitable. It shows further, that it is requisite to look not only to the admission of air, but to the previous loss of blood.

In these circumstances, the case by M. Pellis, however conclusive as to the fact of air having been forced into the vein, and death resulting thence, must be regarded as greatly less so than that given by Dr Handyside. In the former case the quantity of blood lost was very great, so great as to induce one fit of partial and another of complete fainting; in the latter there was no evidence that the patient had fainted at all; and the quantity lost appears to have been smaller. But whatever may be said on this point, it is evident that, if the case of M. Pellis be admitted as a satisfactory instance of death in consequence of the admission of air into the veins, that by Dr Handyside must *à fortiori* be regarded as a still more satisfactory and conclusive example of the accident.

The observations now made on the influence of the loss of blood, or of faintness, in inducing long-drawn deep inspirations, and, consequently, favouring the ingress of air into the veins, when wounded, are in complete accordance with the results observed by M. Amussat in his experiments on the lower animals. He always observed, as we shall presently see, that the danger of the introduction of air into the veins is the greater, as the animal has lost a large quantity of blood.

It is time, however, that we should direct attention to the general deductions which M. Amussat draws from the facts now recorded, as these contain a concentrated view of all the circumstances under which this dreadful accident is likely to take place. These facts, which amount in all to thirty-nine, the author employs in order to make a general statistical return of them; and these may be presented in the following manner.

The whole thirty-nine facts naturally arrange themselves in five distinct classes or categories. The first category consists of ten facts, which may be called incontestible, in so far as their correctness receives confirmation from the evidence of dissection. The second category contains six facts analogous to the preceding, but without the evidence of dissection. The third contains fourteen instances of air admitted into the veins, twelve in man and two in animals, and in which recovery took place. The fourth division contains seven doubtful facts. And the fifth contains two instances of suicide produced by wound in the neck, and in which there was strong reason to believe death had been the result of the ingress of air into the veins.

Viewed in the relation of the diseases and operations, these 39 cases resolve themselves into the following divisions.

1. Nine instances of tumour of the neck; 2. seven instances of operation on the shoulder or the arm-pit; viz. two cases of tumour of the right shoulder; three cases of extirpation of the arm; and two tumours of the axillary region; 3. six cases of tumour of the breast; 4. two cases of ligature of the subclavian artery; 5. four cases of tumour of the face; 6. five instances of blood-letting from the jugular vein, two in man, and three in the horse; 7. four cases of wounds of the jugular vein, (suicidal); and 8. two cases without positive indication of the nature of the operation.

Considering the cases as to the veins by which the air has been introduced, the following are the results.

1. By wound of the external jugular vein, the phenomenon took place four times; 2. by the external jugular vein twelve times; four times by blood-letting in the neck; 3. by the veins of the neck canalised, that is rendered open continuous canals, four times; (see pages 208 and 210;) 4. by the subclavian vein, once; 5. by the axillary vein, three times; 6. by the subscapular vein, twice; 7. by a vein opening into the subclavian, once; 8. by the pectoral veins, three times; 9. by the facial vein once; and, 10. six or eight times, the veins opened have not been specified.

As to the duration and the stage of the operations, death took place eight times at the close of long and laborious operations, which weakened the patients by hemorrhagy and nervous exhaustion; and especially at the termination of the operation, at the moment when the tumour is removed.

Twice, however, death took place in consequence of the accident occurring at the commencement of the operation. Death, it must be further remarked, is more prompt when the patients are most enfeebled, as was seen in the cases which occurred to M. Delpech, M. Castara, and M. Roux.

As to the duration of the accident, we find that, among sixteen deaths, the authors of the cases say, eight in nine times, that death took place suddenly, without specifying the actual duration.

In one case (Ulrich,) death took place one minute after the accident; in one case (Beauchene,) forty-five minutes after; in one case (Clemot,) some hours after; in one case (Mirault,) three hours and a-half after; in one case (Roux,) seven days after the accident.

In many cases of recovery it is almost always at the commencement of the operation that the accident has occurred. In the case recorded by M. Amussat himself, however, the accident took place at the end of a long and laborious operation. In this case, however, he observes little air entered, because the vessel was small, and the opening was promptly closed.

There is, however, a very obvious reason for the accident occurring more commonly at the close of an operation than at its commencement. It is then chiefly that the deep-seated vessels are divided; it is then, above all, that those vessels are most usually divided, which are most directly connected with the veins of the chest.

M. Amussat remarks as to sex and age, that the cases give seventeen men from 21 to 60 years; seventeen females from 18 to 68; two cases in which the age and sex are not specified; and three horses. It must be observed on this head, that it is not very philosophical to trace any connection in this inquiry between the ages of the patients, or even the sex, and the accident. It is quite clear, that it is the primary disorder that ought, in such circumstances to be kept in view. Tumours of the neck or shoulder requiring operation may occur at any age. Most of the cases of tumours of the neck were examples of encephaloma; those of the shoulder were either of that nature, or *osteo-sarcoma;* and the tumours in the breast and axilla appear to have been scirrhus or carcinoma.

In those circumstances it is almost superfluous for M. Amussat to say, that it is interesting to observe, that the phenomenon has not been observed in children, and to add, that the reason is perhaps because at that age there is less frequent occasion to perform operations in the dangerous region.

II. Though the collection of facts already adduced may be regarded as competent to establish the truth of the general inference, that air may, in certain circumstances, be introduced into the veins of the animal body, and that, when introduced, it speedily gives rise to most pernicious and commonly mortal effects, yet there are various other points which require either confirmation or some elucidation. Of this kind are the questions, what are the circumstances favourable or unfavourable to the introduction of air into the venous system; why is air inspired or drawn into the veins of one part of the body and not into those of another; and are there any known means by which this accident may be prevented, or if it take place, its pernicious effects may be counteracted. To throw some light on, if not to determine these questions, is the great object of the experimental inquiry undertaken by M. Amussat.

M. Amussat divides his inquiry into three chapters; the first relating to the spontaneous introduction of air into the veins; the second relating to the forced or artificial introduction of air into the venous system; and the third devoted to the examination of the means of preventing or arresting the accident, or counteracting its effects.

A. M. Amussat observes, in the first place, in reference to the spontaneous introduction of air into the veins, that his researches show that air cannot be introduced spontaneously into all veins. These researches show that this phenomenon can take place in the normal state only in those veins in which there is a reflux of blood, or what is designated by the name of the venous pulse (*pulsus venosus.*) On this subject Haller may be consulted, lib. vi. sect. iv. It is sufficient to say, that these veins are all those which are situate at the anterior part of the neck, at the upper part of the chest, and in the arm-pit. The space in which these accidents are likely to take place, and to which he applies the name of *dangerous*, may be circumscribed by two semi-elliptical lines, going from one arm-pit to the other, the one above the collar-bones, the other below them. But if the veins be supposed to be canalized or converted into cylindrical tubes like the arteries, the phenomenon might take place over a much larger extent.

The experiments performed by M. Amussat are of three orders. In the first are placed all those experiments which relate to the spontaneous introduction of air into the veins of animals in the normal state. In the second are placed all those experiments which demonstrate the influence of the abstraction of a certain quantity of blood before the production of the spontaneous phenomenon. And in the third division, he proposes to prove that, by converting the veins into uncollapsing canals, the spontaneous phenomenon may be produced at a much greater distance from the heart, than is observed in the normal state.

These experiments were performed on rabbits, dogs, sheep, and horses, by exposing one or other jugular vein, or the axillary vein, and thus allowing the air to enter without any additional contrivance. In the second series of experiments, quantities of blood, varying from a few ounces to some pounds, according to the size of the animal, were previously withdrawn. In the third series of experiments, M. Amussat introduced a caoutchouc tube into the interior of the veins, and in this manner rendered these tissues inflexible or incapable of collapsing. Our limits do not allow us to detail these experiments; but we give the results obtained in each order of cases.

Of the first series of experiments, the following summary gives the general results.

It may be regarded as established, that the spontaneous introduction of air by a vein wounded near the apex of the chest, in animals of different sizes, produces almost always death in a manner more or less sudden.

Among twenty-six animals subjected to this experiment 24 died, 2 resisted. The rabbits died in the course of from one minute and a half, to 2, 3, or 5 minutes. The dogs died in the course of one minute, 3, 6, 10, 16, 24, and 27 minutes. Two survived. The sheep died in the course of from 19 to 56 minutes. The horses died in the course of 14, 15, 17, 26, 28, 35, minutes, 1 hour and 44 minutes, 1 hour and 50 minutes, and 2 hours and 30 minutes. One animal alone resisted, because, having fallen with the neck supported against a tree, there was formed a clot which plugged up the opening in the vein. But when the clot was removed, he died 26 minutes afterwards.

As a general rule, the duration of each experiment is included between the moment of the introduction of the air and death. As soon as the eyelids begin to flutter, when a finger is placed on the animal's eye, it is understood that life has then ceased.

In almost all these experiments the right cavities of the heart alone contained frothy blood. The lungs were sound. The veins of the brain contained seldom some bells of air.

B. Of the second series of experiments, the following summary gives the results.

It appeared clearly that depletion, by withdrawing a certain quantity of blood from the vessels, has considerable influence on the prompitude with which the effects of the spontaneous introduction of air take place. Among 16 animals subjected to this kind of experiment 14 died; one alone, a dog, resisted its effects. In another dog some bells of air were allowed to enter; and he was destroyed in order to ascertain whether the air had been admitted. The dogs died in the course of 1, 4, 6, and 25 minutes; The sheep after 7 and 16 minutes; the horses after 3 minutes and a half, 9, 12, 13, 16, and 23 minutes.

In some cases, as in the second experiment, on the horse, the phenomena approach with as great rapidity as in the case of the forced and sudden insufflation. The symptoms are the same; death is as speedy; and on inspection air is also found in the left cavities. This difference can be explained only by the facility with which the air passes through the vessels, suddenly emptied. Death takes place doubtless more speedily, because the three principal organs are injured by the presence of air in the vessels.

To conclude, it may be said that the spontaneous introduction of air by a wounded vein, determines death so much more quickly, as the animal has lost a greater quantity of blood, or as he has been exhausted by pain. It is doubtful whether debility from any other cause can produce the same result. It might appear at first sight, that debility from fatigue, old age, or disease, ought to be equivalent in influence to the abstraction of a certain quantity of blood. But the experiments upon horses, most of which were diseased, prove that it is not those which are most feeble in appearance that resist least. A horse that could scarcely stand from absolute debility survived the commencement of the experiment sixteen minutes.

C. The third series of experiments shows that if a tube be introduced into a vein beyond the point of reflux of the blood, or, in other words, beyond the dangerous region, and carried into the dangerous region through the vein, air may be in this manner also introduced into the superior cava and heart, and the usual effects will follow. It appears, in short, from these experiments, that, if a wounded vein be dilated and kept open like an artery by an organic disease, the phenomenon of the spontaneous introduction of air is almost as much to be dreaded, as if the vein were wounded within the limits of the venous pulse.

In the second chapter, M. Amussat details the experiments on the forced or artificial introduction of air into the veins. Air may be introduced into veins in this mode, either suddenly or slowly. In the first case it almost uniformly produces speedy and irrecoverable death, as is well known by the experiments of Nysten. The results of the experiments performed by M. Amussat may be stated in the following manner.

Among 18 animals subjected to this sort of experiment 15 died. Rabbits died in the course of from 50 seconds to 1 minute; dogs in the course of 2 minutes; sheep in from 1 to 2 minutes; and horses in the course of 3, 5, 6, 6½, 13, and 16 minutes. Three dogs resisted the experiment, which was performed by injecting air with a syringe.

The symptoms observed are nearly the same in all. Whatever be the animal, death is instantaneous. He falls as if struck by lightning or stunned by the blow of a mace. Scarcely is there time to observe what passes between the instant of the forced introduction of air and death.

Sometimes, however, the animals resist longer, 16 minutes, for instance, as seen in the last experiments upon the horses. But in these cases the insufflation had been made gently, and by a person whose lungs were of small capacity.

Another source of difference in results may also be the circumstance, that in some cases it was deemed unnecessary to tie the veins on the tube employed for insufflation; and when this is neglected, it may happen that the air returns between the *parietes* of the vein and the tube.

In all the cases, the heart is distended with frothy blood; and the venous and arterial vessels are more or less filled with air.

Death takes place evidently from the interruption of the circulation. The air distends the right chambers of the heart, and prevents the venous blood from reaching them.

When the air is introduced forcibly but slowly, the phenomena are quite the same; but the result is longer in taking place, and death consequently is slower in approaching. This depends on the gradual introduction of air, because then the harmony of the functions of respiration and circulation is not suddenly destroyed. In general, a larger quantity of air is required to produce the effect, when it is impelled gently into the venous system ; and in some instances, it does not in this mode produce the fatal termination.

On comparing these last results with those of the first series, that is, those of the spontaneous introduction of air into the veins, it is seen that there is a great analogy between the phenomena which ensue when the air is impelled gently, and when it is introduced spontaneously. The symptoms are the same; and the animals die nearly in the same space of time.

There is nevertheless this remarkable difference, that after death produced by the spontaneous introduction of air, in general the right chambers only of the heart are distended with air, whereas, after its forcible introduction, air is found in the left chambers as well in the arteries as the veins.

The difference in the rate of rapidity with which death takes place, may be explained by saying, that, in the forcible introduction of air, the functions of the heart, of the lungs, and of the brain are disturbed, while in the case of slow or spontaneous introduction, the disturbance is confined to the two first organs.

D. These experiments, and the results obtained by them, lead naturally to the third object of inquiry, namely, to ascertain whether we possess any means of preventing or arresting this formidable accident, or, after it takes place, of counteracting its effects. Though the experiments undertaken with the first two objects are calculated to throw some light on this question, M. Amussat has devoted to its express elucidation ten experiments; and the results of these may be stated in the following manner.

It appears, that it is not possible to prevent the occurrence of this accident by previously compressing the chest and belly, as has been imagined. The only compression which is efficacious is that which is applied directly over the vein, or the principal venous trunk; and the best means of remedying as much as possible the accident, is to close quickly the aperture by which the air has obtained admission. By observing this precaution, the continuance of the phenomenon is prevented, and the animal may survive, if too much air has not been introduced. The same result sometimes takes place when a clot is formed in the aperture.

When much air has obtained admission, and the animal resists its effects, if frothy blood escapes at each expiration, it is a favourable symptom ; for if the opening be closed, the animal, which might have lived, dies speedily.

M. Amussat concludes, therefore, that the experiments detailed in the present essay lead naturally to the use of the means which he has specified, and which consist in stopping at first the aperture, or causing the patient to make quickly motions of inspiration, and in favouring this time of respiration by compressing the chest and the belly, in order to expel the air introduced.

There is, however, in this statement a singular inconsistency, which may lead to an important and serious practical error. M. Amussat says, that the means of arresting the accident consist in first stopping the aperture, and causing the patient to perform motions of expiration. Now, to any one who knows anything either of this accident, or of the influence of respiration on its occurrence, it must appear absurd and impracticable to speak of *closing* the aperture, and causing the patient to make efforts of *expiration*. If efforts of expiration be made while the aperture is closed, not the slightest benefit will result; and if it be wished to prevent the accident from going further, the aperture should be open, while the patient makes efforts of expiration. It is during *inspiration* that the aperture ought to be closed, because it is during inspiration that the air is liable to be drawn in by a vein situate within the influence of the function of respiration. There is no risk of air being drawn in during *expiration*, but some risk lest it may not be expelled if already admitted. The rule, therefore, ought to be, instead of first closing the aperture, and directing the patient to make efforts of expiration, to close the aperture the moment the hissing sound is heard, and keep it closed during *inspiration*; but if air have been admitted, to open it during *expiration*, in order to favour the escape of air, which always comes away in the form of frothy blood. It must be observed, nevertheless, that, unless this can be done with perfect accuracy, the best and safest course is to keep the aperture constantly shut, as the slightest mistake in opening the aperture during *inspiration* instead of *expiration*, may, by giving admission to a large quantity of air, prove instantly fatal. When it is kept closed, there is no chance of further admission to air; and if that already admitted be not very great, it is absorbed, and the circulation is re-established. This result, there is good reason to believe, took place in those instances of recovery in which air had obtained admission into the venous system.

M. Amussat further thinks, that the best means of counteracting the effects of the accidental admission of air into the venous system consists in pumping out the air introduced into the heart; and that it is requisite to introduce promptly a tube, in order to make aspiration, that is, exhaustion of the air, as it passes rapidly into the ventricle, and even into the vascular system. This practice may be successful; but we cannot help looking upon it as exceedingly dangerous, and likely to be detrimental. The chance of extracting air in this manner is small and precarious; and, unless the utmost care be taken, air is as likely to be admittted as extracted. M. Amussat himself allows that the animal sometimes dies, before there is time to operate, when all the preparations are previously made.

The general result of the whole of the experimental researches detailed in this part of his work, M. Amussat comprehends in the following fifteen aphorisms, which we annex as presenting a condensed view of the conclusions of the whole matter.

1. The spontaneous introduction of air by an opening made in a vein in the neighbourhood of the lower part of the neck, and upper part of the chest, where the reflux of the venous blood is observed, is a constant phenomenon.

2. Air introduced in this manner produces almost always a peculiar sound, which cannot be mistaken, when once heard, and which it is difficult to confound with any other noise, because it has peculiar characters.

3. The intensity of the phenomenon is in proportion to the aperture in the vein, its size, the vicinity to the heart, and especially the force of inspiration.

4. The danger of the introduction of air into the veins is greater in proportion to the quantity of blood lost by the animal.

5. Death is so much the more speedy, in proportion as the animal has suffered long.

6. On opening the chest of animals dead suddenly by the spontaneous introduction of air into the veins, the right chambers of the heart are found constantly distended, inflated with air, more or less mixed with blood, while the left chambers are almost always empty, collapsed, and contain little or no air.

7. The cause of death appears especially to be attributable to the interruption of the pulmonary circulation.

8. The vertical position often favours the introduction of air, because the animal is agitated, and makes great inspirations.

9. The phenomenon may take place beyond its legitimate limits, fixed by the reflux of the blood, by canalizing the vein by means of a tube.

10. The sudden and forcible introduction of air into the veins produces almost invariably instant death, in animals very different in species and size.

11. The previous compression of the chest and of the abdomen does not prevent the occurrence of the spontaneous introduction of air.

12. The aspiration of air by a wounded vein is produced altogether by the thoracic walls, and in no degree either by the heart or lungs.

13. Air escapes during expiration in all the positions in which an animal is placed; but in the standing attitude, the blood remains in the wound, is there coagulated, and plugs up the aperture.

14. Compression of the chest and belly after expiration favours the issue of the air, and by repeating this manœuvre several times the heart is aided in ridding itself of the air which distends its right chambers.

15. Lastly, aspiration by a glass-tube and syringe shows that more blood than air is withdrawn; but the blood may be repelled, retaining the air, and the operation may be resumed, so as to aspire almost all the air contained in the right chambers of the heart.

Upon these aphorisms, we have nothing to observe, further than what has been already said on the stoppage of the wound during inspiration, and the probable dangerous effects of attempting aspiration.

III. In the third part of his essay, M. Amussat undertakes to give an explanation of the phenomenon of the spontaneous introduction of air into the veins.

He first proceeds to answer any objection that might be urged against the fact of the presence of air in the right chambers of the heart, by showing that air, in such circumstances, could not proceed from decomposition, or be introduced by incautious opening of the cavities. It is always possible to distinguish between air generated under such circumstances and that introduced accidentally, by the presence of other marks of decomposition, and by the circumstance of air being found in other cavities and parts of the body. In this accident, on the other hand, the right chambers only are distended with air mixed with blood; the blood also is frothy, if the body be examined immediately or soon after the accident; and the left chambers are almost always empty. It is impossible, therefore, to confound the appearances with cadaveric effects.

Another proof which shows that it is impossible to confound the circumstances and effects of the accidental introduction of air into the veins during life with cadaveric appearances, even with the presence of a large quantity of air in the heart, is obtained from performing on a dead body the following experiment. If, after opening one of the jugular or the subclavian veins very near the chest, alternate pressure be made on the walls of this cavity, in order to imitate respiration, then air obtains admission, because the chest performs the function of a sucking pump. If the chest and pericardium be opened carefully, the right chambers are found distended and inflated with air, and the left chambers are in their usual state. Upon opening the right chambers air escapes in a body, and they collapse. On opening the left chambers, nothing of the kind is observed. In this case the right chambers are distended with air, but the air is not mixed with blood. The blood is not frothy; an essential character which establishes a difference between air introduced during life and air introduced after death.

The knowledge of these facts is of importance in a medico-legal point of view.

From all the facts described by the experiments now mentioned, it results almost inevitably, that the introduction of air into a wounded vein near the upper part of the chest is a physical and almost purely mechanical phenomenon. It is a mechanical effect of the action of bellows, produced by the external pressure of the air on the right chambers of the heart. The alternate motion of the chest determines the entrance of the air; and it does so by acting on veins which are not, by their position, allowed to collapse. The adherence of the venous parietes to their cellular sheaths, where they form canals, and where these sheaths adhere to bones, as in the case of the subclavian veins, and the reflux of the blood by the motion of respiration, are the two causes which determine the admission of air into the wounded veins near the upper part of the chest.

He very properly remarks, that the action of the auricle, which in propelling the blood produces an oscillation in that column which regurgitates in the *venæ cavæ*, performs no part in the introduction of air into the veins, in which the venous pulse is observed.

It is known that this name is applied to the reflux of blood which is observed in the jugular and subclavian vein during expiration, and which depends on the temporary impediment given to the progress of the blood in the *venæ cavæ* at the moment at which expiration takes place, and the lungs sink, and the blood of the pulmonary artery is consequently prevented from continuing its progress. This refluent motion or mere stationary condition of the blood during inspiration is very distinct in the jugular veins of emaciated persons, when the breathing is difficult or embarrassed, in diseases of the heart, and in persons in the last agonies.

The phenomena of the venous pulse or the reflux of blood may be easily observed in animals. It is distinctly seen in the jugular and subclavian veins, at some distance from the chest, in the swelling of these vessels. In great motions of expiration, the reflux ascends to some height, when the circulating currents are unimpeded; but when the blood is prevented from moving, the reflux ascends only one or two inches above the first rib.

M. Amussat further thinks that this reflux is particularly produced by the compression of the right auricle, and of the *venæ cavæ*, by the lung during the motion of expiration. This cause we must regard as very doubtful in its operation. The lung may compress the auricle and the *venæ cavæ*; but would this compression produce the effect? The cause which appears to us much more efficient is that already assigned, namely, the temporary but sudden stop which the blood of the pulmonary artery encounters during expiration and the collapse of the lung, and which has the effect of interrupting the progress of the blood through the ventricle, auricle, and *venæ cavæ* at once.

Before quitting this part of the subject, it is requisite to notice that a different hypothesis, both as to the cause of the introduction of the air, and as to the mode in which its presence produces death, has been recently propounded by Sir Charles Bell.

The admission of air, Sir Charles ascribes, in the first instance, to the elevation of the muscles of the neck, by which the atmospheric pressure is taken off, and the air is drawn into the open vein. This, he conceives, is provided by the fact, that if in the dead subject an incision be made in the lower part of the neck, the external jugular vein is found flat or collapsed; but if an incision be made on raising the shoulder and collar-bone of that side, the vein opens; and if any fluid be poured into the hollow space of the neck, and the motions of respiration be imitated by alternately raising and depressing the shoulder and collar-bone, the fluid gradually descends into the vein.

It is probable that the elevation of the shoulder and clavicle does take off pressure from the vein; but it seems also impossible to doubt that it has the effect of opening the vein and thereby canalizing it.

From observing the very rapid manner in which death takes place in consequence of this accident, Sir Charles infers that it is the effect of the air entering the vertebral arteries, thus depriving the *medulla oblongata* of blood, and immediately thereby extinguishing in its source, all motion, voice, and expression. A doctrine very similar had been previously taught, first, by Bichat in a general manner, regarding the brain being the organ first affected, and afterwards more particularly as to the *medulla oblongata* being disordered in its circulation, by Dr Handyside.

IV. The fourth part of the essay is devoted to the practical deductions. These have been in a great degree already anticipated; and the necessity of drawing these observations to a close prevents us from dwelling on the subject.

It is only in the case of operations on the neck, the upper part of the chest, the arm-pit, and the shoulder, that this accident is really to be dreaded. And it more particularly immediately above and immediately below the collar-bone, in a circumscribed space, where the reflux of the blood or the venous pulse is observed, that it most usually happens. Particular circumstances, however, as the adhesion of a tumour to a vein, rigidity of the surrounding parts, and similar causes, may extend the sphere of danger, so that incisions beyond the boundary specified may be followed by the introduction of air into the veins.

Under all circumstances, the best rule that can be laid down as preventive consists in compressing the principal venous trunk, between the heart and the part on which the operation is to be performed.

The application of this rule to particular cases constitutes the great difficulty in practice. In the case of venesection from the jugular vein, it is necessary to avoid opening that vessel low down, within reach of the reflux of the blood, and it is further requisite that the wound in the skin and that in the vein be quite parallel.

M. Amussat expresses an apprehension, that the dread of this accident may deter timid and cautious surgeons from attempting important operations in the neck and shoulder, or in the arm-pit. He sees reason also to blame the surgeons of small localities for excessive reserve, lest professional jealousy should take an opportunity of proclaiming any unsuccessful results. It cannot be denied that M. Amussat has good grounds both for the apprehension and the censure; and it too often happens, that a rash and ignorant confidence will urge one man to undertake operations, which others more modest and timid, but better informed and better qualified, would have declined. The remedy for both is knowledge, and especially that knowledge recommended by M. Amussat, which is obtained by performing the operation, or, at least, imitating its performance on the lower animals several times, before it be attempted on the human subject. As to the extreme reserve deprecated by the author, and the cause to which he ascribes it, it is unfortunately a dark page in the history of surgeons, that too often any mishap is blazoned with the most benevolent zeal and assiduity,—sometimes with a reasonable amount of commiseration for the man who has been so unfortunate or so ill-advised; while every favourable case is allowed to pass in silence and obscurity. For this there is no remedy, except to recommend every one who censures, to consider what he would or could have done in similar circumstances; and if he be conscientious, he will be sparing in the language of censure or criticism.

In a sort of supplementary note, M. Amussat adverts to sudden deaths after delivery, which may have proceeded from the admission of air into the veins. It is a known fact, that females have died immediately or soon after child-birth, in circumstances which rendered it impossible to ascribe the event to hemorrhage, the most usual cause of death at that time. M. Chomel states in one of his lectures, that, in the course of six years, he knew that among 450 individuals dead at La Charité, 7 died in an unexpected manner, while the most minute examination after death did not disclose any thing which could explain the sudden and fatal termination. In these cases, he conjectures that the cause might have been the admission of bells of air from the womb into the blood-vessels. Similar facts appear to have occurred in the practice of Baudelocque.

ART. III.—*The Physiology or Mechanism of Blushing, illustrative of the influence of Mental Emotion on the Capillary Circulation; with a general view of the Sympathies, and the Organic Relations of those structures with which they seem to be connected.* By THOMAS H. BURGESS, M. D. &c. &c. London, 1839. Pp. 202.

UNPROMISING as this title would at first sight lead us to believe this work would be, Dr Burgess has contrived to bring together a quantity of matter, which renders the subject by no means devoid of interest, either to the general reader or to the student of physiology. Comparatively little has hitherto been done in this country to trace the influence of the involuntary acts of the mind, on the vital organs or their functions, excepting what is found in the writings of Robert Whytt, Falconer, and a few other writers. Among foreign authors, however, the subject has been treated much more extensively and in a manner much more elaborate; and has in various modes been investigated by Gautier,[*] Hubner,[†] Hebenstreit,[‡] Schlosser,[§] and Bichat;[||] and at a more recent period, Bellingeri casually explained its mechanism, or mode of accomplishment.[¶] To the phenomena and causes of blushing, however, no separate monographs have been devoted; and it must be with different individuals a matter of opinion how far the subject requires this elaborate illustration. It is chiefly, however, to supply this deficiency, that the author has been induced to direct his attention to the phenomena of blushing, as it appeared, from its intimate connection with the sympathies in general, to be well fitted to illustrate their mode of action.

The author in his introductory remarks, in order to show the extent of the subject, says, "I shall endeavour to demonstrate the intimate connection between the phenomenon of blushing, and moral and physical science generally. With anatomy, in particular, I shall show its relations, in so far as the nerves, skin, and arteries are concerned; with physiology, as regards the mechanism by

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[*] Dissertatio Inaug. Med. de Irritabilitatis Notione, &c. quam, &c. die 28 Aug. 1793, subjecit Joan. Lud. Gautier. Halæ.

[†] Coenesthesis. Diss. Inaug. Med. quam die 23d April 1794 defendet Christian Frid. Hubner. Halae.

[‡] Brevis Expositio Doctrinae Physiolog. de Turgore vitali, 1795. Lipsiae instituta, ab Ernesto B. G. Hebenstreit, M. D. &c. in Acad Lips. Prof.

[§] Georgii Eduardi Schlosser, Med. Moeno-Francofurtensis, &c. Dissert. de Turgore Vitali apud Brera sillogen, Vol. vii. Ticini, 1807.

[||] C. F. Bellingeri, Dissert. Inauguralis quam publice defendebat 1818 die 9no Maii, &c. Augustae Turinorum. "Amoene rubet pudibundae puellae facies a libero loquendi gestiendive modo." p. 127,

which it is produced; with comparative anatomy; with the natural history of the species, and lastly, with moral philosophy, in numerous interesting points of contact."—P. 4.

How far Dr Burgess succeeds may be gathered from what follows. It is necessary, however, to mention, that he confines his inquiry chiefly to the actual phenomenon of blushing, that is to say, to the vital acts which lead to the production of the blush; as he considers any inquiry into the causes which set in motion the vital actions, whether moral or otherwise, to be beyond the reach of human intellect.

Dr Burgess treats his subject under four heads. 1. A history of the phenomenon of blushing as observed in the different tribes of the human race. 2. The anatomy of the parts engaged in its production, as the brain, nerves, heart, blood-vessels, and skin. 3. The mechanism by which all those parts are combined and put in motion before the blush can be excited on the cheek. 4. On the moral and physical treatment of the mental emotions, arising from diseased sensibility.

The poetry of blushing first engages Dr Burgess's attention. He points out the frequency with which the poets allude to the subject, and the heightened effect it produces in their descriptions of beauty, and contrasts it with the blanched cheek of fear. Blushing, in its diseased form, he regards as the result of an over-refined state of sensibility; and, though it is not easy to see the connection between the mental emotion, which leads to the act of blushing, and the animal act of sensation, Dr Burgess devotes the next chapter to the sensations observed in plants, in the lower animals, and also in man. It is to be regretted, that Dr Burgess did not adopt the word sensitiveness to express the power which a living body possesses of feeling pain, hunger, &c. and limited the employment of the word sensibility to the expression of the emotions of the mind. Such a distinction would have rendered his essay much more philosophical and complete, and besides have saved much unnecessary explanation.

The author divides sensibility into true and false. True sensibility he defines as, " that state of feeling which draws a distinction between right and wrong, and is not liable to all impressions indiscriminately ;" and the false as " a peculiar irritability of that part of the sensorium which receives the impression of our ideas, which is liable to be disturbed or excited by the slightest effort of the imagination, and is as frequently excited by fanciful or imaginary, as by real causes." Blushing is excited by both varieties, but by the latter more frequently than by the former. The author, however, instances the occurrence of the blush of shame on the cheek as the proof of design, as the being made to blush for past misconduct in many cases prevents the individual from violating the laws of morality. If the blush was induced from this cause alone, and were produced in every case where the laws of morality had been violated, such an argument might have held; but unfortunately two strong objections exist to such a conclusion being drawn in the present sophisticated state of society, the one, that those most sunk in guilt become dead to the feeling of shame, and never blush; and the other objection he himself has given in the following words; " Unfortunately civilisation or refinement seems to have perverted the original intent, if my hypothesis be correct, for now it is difficult to judge whether the blush be from an impulse of shame, or merely from a sensibility that is overwrought; and if my judgment does not err, it is much more frequently the effect of the latter than the former."

Dr Burgess combats the idea, that the black races of mankind are incapable of manifesting their internal emotions by blushing. He affirms that the negro as well as the European blushes, but that the swarthy colour of the negro's cheek prevents the red tint from being manifested to the sight, in the same way as it is in the cheek of the white. He cites one curious case where a large cicatrix existed on the cheek of a negress, which invariably became red whenever she was abruptly spoken to, or charged with any trivial offence. When a negro blushes, Dr Burgess affirms, the cheeks become darker than before, and he explains the phenomenon in the following manner.

" When the blood rises as far as the *rete mucosum*, (which is naturally black in this variety,) in place of the redness becoming apparent, as it does in the white, now from the dark veil placed before it, and through which it cannot pass, it only tends to render the surface of a deeper hue than before, for which purpose no colours are more adapted than black with a *red ground*, and M. Biett observes, that the red tint which characterizes the exanthematous diseases in the Caucasian variety, never exist in the negro: in this case, on the contrary, the black tint is more evident than before."—P. 33.

As an additional argument that the negro blushes, is instanced the fact of the Albinos of the negro race being capable of exhibiting the state of their internal emotions by blushing, examples of which Dr Burgess has himself witnessed.

Dr Burgess is entitled to some credit for his defence of the negro, and for his endeavour to efface the imputation which is often cast on that race, especially on the other side the Atlantic, of " how can those be trusted who know not how to blush ?" The privilege of blushing has been granted to all races whose skin is not too deep coloured to prevent the " blood's mantling flow" from being seen, excepting the negro; yet why this race should not possess the same characteristics as all other races of the human species, it is difficult to perceive.

The different varieties of blush the author divides into true and false; ranging under the first all those changes in colour which have some good substantial moral cause for their production; and under the latter, those which arise from no other assignable cause than an extreme state of morbid sensibility. The drooping of the features, which invariably accompanies the act of blushing, Dr Burgess regards as the diagnostic mark of the true blush, which distinguishes it from the hectic flush or the flush of rage. This character, however, does not enable us to distinguish the true from the false blush, or as the latter is better known by the name of the blush of bashfulness or modesty, as in both these cases there is the same drooping of the features. Idiots have not been observed to blush; and this the author attributes to the want of reason, as they are insensible to the feelings of honour, shame, or disgrace; and the same fact is noticed with regard to a person in a state of inebriation, reason being then dormant.

The turgescence observed in the comb of the turkey and game cock, Dr Burgess considers as analogous to the flushing from rage observed in man;—phenomena which are, however, quite distinct from the true blush. The colours of flowers, and phenomena of turgescence observed in plants, are also alluded to, as presenting analogies similar to those of the animal kingdom.

In the second section, the anatomy of the parts engaged in the production of blushing is described. He takes a view of the structure and functions of the brain, spinal marrow, sympathetic nerves and ganglia, together with the relative action of the heart and capillary vessels in propelling the blood, and how far these are subject to the influence of the nervous system. He then passes to a description of the skin of the cheek, and endeavours to explain the reason of this part of the body being peculiarly the seat of blushing from mental emotions. This he attributes to three causes: 1. To the fact that the cheek is always more or less coloured, so that in blushing the quantity of blood is only somewhat increased. 2. To the anatomical arrangement of the capillaries in these parts, there being a more ready communication between them and the arteries of the corion than in other parts of the body; and 3. To the superior sensibility of the face.

The mechanism of blushing is considered in the third section; and the order of the phenomena which precede and attend the act of blushing minutely described. First, there is the indescribable sensation caused by the impression on the sensorium; presently a kind of fluctuating glow pervades the entire frame, there is great mental confusion, the eye languishes, and the countenance droops. There is a thrill or throbbing of the heart, often visible externally;

a momentary oppression is felt in the region of the stomach; the breathing becomes somewhat affected, the voice becomes changed, and self-possession is for the moment lost. The blush is now felt ascending to the cheek; the skin begins to tingle, and, before the phenomenon is perfected, there is pain, heat, redness, and swelling, or, in other words, a species of temporary inflammation ensues.

The mode in which these various acts which are concerned in the phenomena of blushing are connected together, Dr Burgess explains in the following manner.

> "When the feelings are excited strongly, be it from shame or bashfulness, the *nervous balance* is lost in the cerebrum, and the involuntary powers of the mind gain the ascendency over the *will*, and the agents of volition. The first impression is decidedly made on the sensorium, on the *mens conscia recti*, and affects it in some peculiar manner, the remote cause of which we are not as yet aware. The impulse given to the brain is now conducted thence, in a comparatively slow degree, by the sympathetic *circle* along the thoracic cavity to the heart, stomach, and solar ganglion. The stomach, in particular, is peculiarly influenced by the nervous circulation, which is, perhaps, owing to its vicinity to the union of the semilunar ganglia, independent of the impression conveyed to it by the *par vagum* or eighth pair.
>
> "It is here that indescribable sensation is perceived, which immediately precedes the blush, and that, as it were, gives the first alarm which produces the irresistible *drooping* of the entire countenance, just as the *colour* is beginning to rise upon the cheek; at the same time there is a fluttering sensation felt about the heart, and there seems to be a kind of momentary stagnation of the nervous influence in the præcordial region, while these anomalous feelings are being excited; it is therefore with strict accuracy that John Hunter has applied to this part the expressive designation of the '*centre of sympathies*.'
>
> "At the epigastric centre, the nervous impulse or *spiritus cerebri*, as Boerhaave terms it, seems to pause, 'donec aptus evadat fluere per vascula ultra imaginationem parva omnia,' that is, until by repeated impressions from the sensorium, it becomes, as it were, overcharged with feeling, when suddenly there is an indescribable sensation of *relief* perceived by the individual, as if an oppressive burden was removed. The partially restrained respiration becomes free again, which is announced by an almost imperceptible *sigh*, and *now* a peculiar glow is felt over this region, which is perceived gradually rising from the præcordia, not unlike the *epileptic aura*, through the chest and neck, an involuntary act of deglutition ensues, the heart still sympathising in the general emotion, and at length the flash bursts forth upon the cheek, in a 'living blaze of blood'—*it is the lava of the heart produced by an eruption of feeling*, now rolling through myriads of minute vessels that were hitherto invisible in the cheek." Pp. 172, 173.

In his concluding remarks on this subject, Dr Burgess endeavours to ascertain what class of emotions blushing ought to come under; and he is induced to class it under mixed emotions, seeing it combines phenomena both of excitement and of depression; the excitement of the vascular system, and the drooping of the features and oppression at the praecordial region.

The last chapter contains several sensible remarks on the moral and physical treatment of the mental emotions arising from diseased sensibility, that form which he previously described as giving rise to the false blush. He impresses the advantage of employing kind and soothing treatment, and endeavouring to allay by every means the morbid irritability. Much detriment is often done by upbraiding and reproaching children for bashfulness and timidity; a plan which most frequently increases and renders permanent the evil wished to be checked. Every means which will tend to strengthen the powers of the mind and lead it to habits of reflection, are recommended as highly beneficial; and the utility of increasing the bodily vigour by regular exercise, or gymnastic exercises, is strongly inculcated.

Art. IV.—*An Experimental Inquiry into the Physiology of Cutaneous Absorption, and its application to Therapeutics.* By William Herries Madden, M.D., &c. Edinburgh, 1838. Pp. 152, with a Plate.

This essay was the means of procuring for Dr Madden the honour of a gold medal from the Medical Faculty of the University of Edinburgh in 1837, and we regret that we have been prevented from noticing its contents sooner. The subject is one of great interest to the physiologist and the physician, and the manner in which it has been treated by Dr Madden reflects credit on his intelligence and assiduity.

Dr Madden introduces his subject by pointing out the general belief of the ancients in the absorbent powers of the skin, and their application of therapeutic agents to that organ for the cure or alleviation of disease. After a rapid enumeration of the authors who have taken notice of cutaneous absorption, both those who believe in the existence of such a function and those who deny it, he states that the present belief of physiologists is rather against the skin possessing such a property.

Considering that the most essential step towards obtaining a correct acquaintance with the functions of any part is a perfect knowledge of its structure, Dr Madden gives a concise sketch of the anatomical structure of the skin, both in man and the lower animals. He has confirmed by his own observations most of the recent researches of Breschet and Gurlt, on the minute anatomy of this structure; and as these serve to elucidate the subject under consideration, it may be as well to give a short notice of them.

The *derma*, or true skin, is a dense, tough, elastic, and slightly contractile membrane, possessing extreme sensibility, and abundantly supplied with vessels. Its internal surface is firmly attached to the subjacent parts, and presents the appearance of a network of ligamentous fibres, in the interstices of which are lodged nerves, vessels, and globules of fat. Its external surface is marked by ridges running in a slighly curved direction, and composed of an innumerable multitude of minute conical eminences or papillæ. These papillæ are arranged in continuous rows, are most commonly bifid or trifid, in form resemble blunt cones, and their summits are imbedded in the superjacent cuticle, whilst their bases are lost in the general surface of the true skin. Breschet describes these bodies as deriving a kind of sheath or neurilema from the external surface of the true skin; but Dr Madden is inclined, from his own observations, to consider this as owing to inaccurate observation on the part of Breschet, the uninjected plexus of lymphatics or blood-vessels having been mistaken for an independent sheath. The plexus of lymphatic vessels, in these papillæ, forms an intricate net-work, interwoven with the capillary blood-vessels, but for the most part lying more superficial; but no traces of open orifices have as yet been detected. Nervous filaments enter the base of each papilla, and proceed in the form of undulating striæ towards the summit, where they unite by loops, but do not send off any lateral anastomosing branches.

Such is the structure of the papillæ so far as yet ascertained. The organs which excrete the sweat, first distinctly described by Breschet, and since confirmed by the observations of Gurlt and Dr Madden, may be described in the author's own words.

" The exhalant, then, or diapnogenous apparatus, as he would call it, consists of a secreting gland, situate in the dermis, (*derma,*) in form resembling a sac, somewhat distended, and surrounded with capillary blood-vessels. From its summit a spiral tube proceeds, traversing the fissure between the papillæ, and passing through the epidermis, in a very oblique direction, at the external surface of which it opens, this point being indicated by a slight depression or pore. It will be seen at once that the nature of its course prevents the possibility of any foramen appearing, when the cuticle is raised from the skin, the lacerated ducts immediately retracting, and the apertures being closed by the contact of the upper and lower parietes of the tube. A very beautiful and conclusive proof of the correctness of this account may be readily obtained, by observing with a glass the transudation of the sweat, as it occurs at the palms of the hands, or the tips of the fingers, when the first drop will be seen to be preceded by an elevation of the cuticle after the manner of a valve. The filaments, therefore, which are perceived stretching between the cuticle and cutis, when these two membranes are separated, and which have been denominated by various authors absorbents, exhalants, nerves, or films of mucus, are now shown beyond doubt to be the excretory ducts above described; and it is equally certain that by their means alone is exhalation effected. These ducts, according to several measurements which I made, have a diameter of 1-450th of an inch, the canal occupying about one-third of their breadth; they present a peculiar and very distinct spotted appearance, and are capable of being stretched to a considerable extent before yielding. They may be most readily examined by making a thin vertical section of a piece of the skin of the heel, which has been steeped for some time in a saturated solution of bicarbonate of potass, and then gently separating the cuticle from the cutis. Under these circumstances, they are even visible to the naked eye, stretching between the two membranes, or floating in the water with which the object-glass of the microscope is moistened."—P. 18-19.

In addition to these Breschet describes two other structures; one of which he thought secreted the horny matter of the cuticle, and the other, a spongy organ, secreted the scales; but these observations have not been confirmed by those of Gurlt, and Dr Madden thinks that "Breschet has mistaken for a new structure some of the ordinary sudoriferous glands, whose ducts had by some means been broken off at the surface of the derma; and that the vascular spongy apparatus is nothing more than the net-work of vessels which composes the greater part of the external surface of the cutis."

The structure of the cuticle has given rise to greater difference of opinion than perhaps any other structure of the body, but the microscope, which has done so much for all other minute investigations, promises to be equally useful in unravelling this also. Leeuwenhoeck, whose microscopical investigations are of high value even at the present day, was the first to describe the cuticle as being composed of scales, and the recent minute investigations of Gurlt, Raschkow, Purkinje, and Henle, lead to the very same conclusion. These investigations, Dr Madden has also carefully repeated, and has arrived at the same result.

"The scales in the external part of the cuticle have a most irregular form, being subrotund, angular, polyedral, and frequently with imperfect or lacerated margins, but all with flat surfaces, frequently bent, and so thin that the microscope discovers innumerable quantities of them in the smallest particle which the naked eye can see. In these it is rarely possible to discover any traces of a central spot. But from considering the manner in which the cuticle grows, from examining this membrane as it exists in the embryo, and attending to its structure in the adult, where in close opposition to the skin, or where naturally thin and delicate, as on the *glans penis* and prepuce, Dr Henle has been led to believe that such are not the regular forms. For, in all these situations he found the scales thicker, and bearing the appearance of cells with straight margins, generally of a pentagonal form, and all provided with a central nucleus.

"This nucleus, which is in the centre of each cell, has a smooth or slightly granulated surface, is subrotund or oval, sometimes appears to contain in it lesser granules, and is thicker than the cell, so that it projects on each side.

"The so-called *rete Malpighii* consists of a similar structure, with this exception, that the nuclei of the same size as in other parts, occupy almost the whole of the cells. Dr Sharpey informs me, that he has been able to convince himself of the accuracy of these statements, and the results of my own investigations into this very interesting subject have been such as to confirm the above observations in the most satisfactory manner. On the internal surface of the skin of the penis, in which situation they are most regular, and exhibit most distinctly the central nucleus, these cells have, according to my measurement, a diameter varying from 1-1600th to 1-2400th of an inch, but more commonly the latter; their form is subrotund or pentagonal; and that they possess more of the nature of *cells* than of *scales* is shown by the fact, that they may be seen rolling along the field of the microscope, either without undergoing any change of shape, or exhibiting the lateral projection of the central nucleus. In other parts which I have examined, but more especially on the external surface of the thick cuticular covering of the heel, they are much larger, for the most part about 1-800th of an inch in diameter, very irregular in form, and not exhibiting the central nucleus with any distinctness; some, however, which had a diameter of 1-1600th of an inch, showed this remarkable structure more clearly. That these again are true *scales*, may be easily determined, by watching them closely as they pass over the object glass; when it will be seen that many of them, in turning on their axis, become almost converted into cylinders, by the inflection of their edges, and then in the progress of their course, again unfold themselves, and resume their original flattened appearance. In the epithelium of mucous membranes, which, as will be seen immediately, possesses a structure closely resembling that of the epidermis the cells are united by means of a delicate net-work of some substance, the precise nature of which is as yet unknown, and we may therefore reasonably conclude, that the same means of connection also exist in the parts we are now considering."—P. 28, 29.

It is inferred that the cuticle is possessed of vitality, because it is organized, exhibits physical changes of structure, is liable to morbid alterations, and, like all other structures possessed of vitality, is capable of resisting to a certain extent, the influence of chemical agents. A very good illustration of this last fact is given. The dead skin of the negro was found to be rapidly blanched by exposure to a solution of chloride of lime; but when the hand of a living negro was introduced into the same solution, at the end of an hour the blackness was deepened, instead of being diminished.

Dr Madden next proceeds with the immediate subject of the essay, viz. the absorption by the skin, and this he treats under two heads, 1. absorption from the uninjured skin, and, 2, absorption from the skin after the cuticle has been removed.

The first of these is treated of in four chapters, 1. absorption in the bath; 2. absorption of aqueous vapours from the atmosphere; 3. absorption of miasmatic exhalations and contagion; 4. absorption of medicinal agents.

With regard to the absorption of fluid when applied to the skin, the author quotes the experiments of Simson, Percival, Falconer, Mascagni, and Collard, all of whom remarked a diminution in the bulk of the water in which a limb was immersed for a short time; a diminution which could only be attributed to absorption by the skin. The experiments of Edwards, Burton, and Schreger on the absorptive powers of the skin of the inferior animals, and leading to the same conclusions, are also shortly noticed. These are followed by eight illustrative experiments made on the author's own person, and as they were all performed in a somewhat similar manner, in order to show the general way in which the experiment was conducted, it may be sufficient to quote one, and to mention afterwards the general result.

"Having procured an apparatus, consisting of a large glass jar, to which a syphon-like tube was attached, a quantity of lukewarm water was poured into it, and the free end of the tube immersed in a vessel of coloured water. I then plunged my arm into the jar, and had the surface of the water covered by a layer of oil, to prevent evaporation. At the end of thirty-five minutes, the fluid had risen in the free, and sunk in the attached limb, to the extent of one eighth of an inch; the levels at the commencement having been accurately marked by sticking plaster. Now, since the lowering of the water in the tube could only take place to the same extent as in the larger vessel, and since the diameter of the tube was only two lines, while that of the vessel was three inches, it is quite clear that a very considerable absorption must have taken place. The temperature of the fluid was rather raised than lowered at the end of the experiment, so that the diminution cannot be attributed to contraction."—P. 43-44.

In one of his experiments he oiled the arm, and no absorption took place. In another, he used strong fat beef-tea, and there, too, no perceptible absorption occurred, the fatty and oily matters in these two cases probably preventing the action of the skin. In all the other experiments, whether the fluid used was water, milk, or milk and water, a diminution of the fluid was constantly observed, which could only be accounted for on the supposition of its having been removed by absorption from the cutaneous surface.

That fluids, when applied to the whole surface of the body, are similarly absorbed, Dr Madden next proceeds to prove. He narrates the case related by Vans Mons, where a patient, who was prevented swallowing in consequence of a wound of the larynx, was nourished by the application of sponges soaked in soups to various parts of the body; also the case by Cruickshanks, who relieved his patient's thirst, by immersing him for one hour, morning and evening, in a warm bath. Several interesting instances are also quoted, illustrative of the absorbent powers of the skin, of seamen whose stock of water had failed, relieving themselves of the parching thirst, by dipping their clothes in the sea water, and putting them on wet.

The next set of experiments alluded to are those of Seguin,—experiments which have often been quoted as conclusively proving that the skin does not possess the power of absorption. Dr Madden, however, is of a different opinion, and after a careful examination of all the facts connected with them, satisfactorily shows that they really prove its absorptive power. It may be stated generally, that Seguin found that the body did not increase in weight during immersion in the warm bath, and he hence inferred that cutaneous absorption does not take place. Dr Madden, on the other hand, from the same facts, draws a different conclusion, and for the following reasons. From the experiments of Keill, Cruickshanks, Edwards and others, it appears that the transpiration from the skin, instead of being diminished, is actually much increased by immersion in the warm-bath. Thus Keill computed the amount of transpiration in the air at half an ounce per hour, but in the bath at eight ounces; and Musard believed that even one pound might be lost in that time without the production of sweat. After noticing several other confirmatory facts, he inquires whether the loss by transudation could have been made up by breathing the air of the bath which was saturated with moisture, and arrives at the conclusion, that it could not, both from experiments of his own which he relates, and from those of Edwards and others, on animals confined in air saturated with moisture. Having thus stated the case with regard to the conclusions drawn by Seguin from his experiments, and the different results arrived at by others, Dr Madden sums up in the following words.

> "In this author's second joint memoir with Lavoisier, he has stated that the proportion which the pulmonary bears to the general exhalation is as 7 : 18. Now, in his first series of experiments, at a temperature of 60° F., the quantity lost in the bath was to that lost in the air as 6.5 : 17, showing at a glance that here the lungs

> alone were concerned; and consequently, since cutaneous transpiration was proceeding as before, a quantity of water sufficient to supply this loss must have been absorbed. In the second series, at a temperature between 70° and 80° Fahr., the result is still more favourable, the proportion being as 7.5 : 21.7. But in the third, the loss was much greater, the proportion being as 13 : 23; a result by no means wonderful, if we consider the very elevated temperature, about 100° Fahr., and the excessive transudation which must necessarily have followed.
>
> "Viewed in this light, then, so far from being conclusive against the doctrine we are advocating, these experiments afford convincing proof that water was absorbed."—Pp. 52–53.

The experiments of Drs Currie, Young, and Dill, are also quoted as proof of cutaneous absorption taking place; and the author sums up this part of the subject by giving in detail twelve experiments performed on himself, where the actual weight gained whilst in the bath varied from one to five drachms. In one of his experiments there was a loss of weight of no less than two ounces, but in this case he perspired profusely whilst in the bath, the excessive transpiration had exceeded the quantity of fluid absorbed.

The mode in which Dr Madden conducted his experiments was the following. He was first accurately weighed, and again in half an hour, in order to ascertain the amount of loss in the air during a fixed period of time. Immediately after this he entered the bath, and, to avoid the most distant chance of fallacy from pulmonary absorption, his head was enveloped in an oiled cloth bag, to which a large glass tube was attached, and passed out at the window, so that he breathed the external air alone. After remaining immersed for half an hour, he was carefully dried and again weighed, and the result was as above stated. The quantity of fluid absorbed must have been much greater than was indicated by the actual increase of weight, and, to ascertain its precise amount, it would be necessary to add the quantity of transpiration and of pulmonary exhalation lost during the period of immersion. Thus in his first experiment his average loss in the air was seven drachms and one scruple during the half hour; his actual gain of weight in the bath half an ounce; so that even allowing that no greater amount of transpiration takes place in the warm bath than in the air, the real amount of absorption would amount to eleven drachms and one scruple during the half hour. With this evidence before us it seems difficult to deny the following conclusions of the author.

> "No candid inquirer, no one who approaches the subject unblinded by prejudice, unbiassed by preconceived notions, can, I apprehend, for a moment deny, that the evidence in favour of the absorbing power of the skin is, upon these points, overwhelming; that

it does not rest upon hypothetical grounds, but is founded upon the observation of facts; and that although liable to various modifications of intensity, it may with as much justice be considered a function of the animal economy, as digestion, circulation, or any other process with which the progress of our knowledge has made us acquainted."—P. 65.

The absorption of aqueous vapour from the atmosphere is next considered, and many facts are narrated which seem to prove that such an absorption must take place, in order to account for the great disproportion found to exist in some cases of disease, between the quantity of fluid evacuated, and the solid and fluid nutriment taken into the system, and which the waste of the body will not account for. Diabetes and dropsy are the diseases where this great disproportion has been observed, and Dr Madden gives an account of some of the best authenticated of these, where all sources of fallacy were so far as possible avoided, and he shows that they infallibly lead to the conclusion, that an absorption of aqueous vapours from the atmosphere must have taken place. Besides these, he quotes direct experiments which have been made by various physicians, to ascertain the same fact. Thus De Görter, Keill, Rye, Lining, Home, and others found their bodies to increase in weight after exposure to moist air, the quantity varying from six ounces to six pounds of actual increase of weight. The experiments of Edwards and of Bell on the lower animals, are also noticed as proving the absorption of aqueous vapour by the skin. From these facts Dr Madden draws the following conclusion.

"Upon the whole, then, we are, I think, justified in concluding, that the facts now related certainly constitute additional evidence in favour of the existence of this function of the skin. But, at the same time, if we consider the numerous cases in which the body loses weight, even in a moist atmosphere, and the very few instances of augmentation which have been recorded, it must be admitted, that it is under particular circumstances only that the aqueous vapour contained in the circumambient air finds its way, by this course, into the system."—P. 75.

The absorption of miasmata, exhalations, contagion, &c. is next noticed, and the author is induced to believe, that, in many cases, these may be introduced into the system through the agency of the skin. In proof of this, he narrates the experiments of Bichat, who found that, though he breathed the external air through a tube whilst his body was exposed to the effluvia of the dissecting-room, the gaseous contents of his intestines became impregnated with the same putrid odour as when he breathed the tainted air of the apartment. He also mentions the fact of the oil-carriers and tallow-chandlers, whose skins are more or less smeared with greasy matters, escaping plague and other infectious diseases;

also the increased susceptibility to infection when the stomach is empty, and the cutaneous absorption most active. The communication of contagious diseases by actual contact is also adduced as an example of the skin possessing the power of absorbing contagious matters, though this is probably owing to the absorption of some of the solid or fluid secretions with which it has come in contact.

The author, in his observations on the absorption of medicinal agents by the skin, remarks, that, whatever objections may be urged against the conclusions drawn from the bath experiments, or the absorption of miasmata by the skin, cannot apply to this part of his argument, since, if the application of a drug externally is followed by its usual physiological or therapeutical effect, or its presence be detected in the blood and secretions, not a doubt can remain that the substance so applied has been absorbed into the system. He has collected the numerous detached facts connected with the cutaneous absorption of medicinal agents, besides adding many original experiments made on himself, the whole forming a strong body of evidence, as to the skin possessing absorbent powers. His facts Dr Madden arranges under three heads; 1. Of the absorption of solids. 2. Of the absorptions of fluids. 3. Of the absorptions of gases and vapours.

That medicinal substances, when applied to the sound skin, in their solid state, are absorbed, Dr Madden has given many details; and mentions mercury, iodine, antimony, arsenic, lead, besides several purgatives, narcotics, diuretics, and tonics, which exhibit their peculiar physiological and therapeutical effects when absorbed in this manner. In many of the cases he quotes, the substances were simply confined over the skin, no friction having been employed to promote the absorption, and yet even then the absorption of the medicinal agent was well marked, as evidenced by its effect. The conclusion, therefore, to which the author arrives is, that "different solids, when simply applied to the skin, find their way into the interior, but with very various degrees of rapidity, and that their introduction may be accelerated and rendered more certain by the employment of frictions at the same time."

The effects of various medicinal agents when applied in a liquid form to the skin are described as being equally well marked, and several of them susceptible of being detected by chemical tests in the secretions or the blood. Under this head, Dr Madden relates a number of experiments performed by himself; all of them strongly corroborative of the absorbent powers of the skin. Thus, after the immersion of his arm in a solution of hydriodate of potash for the course of an hour, iodine was detected in his urine. This experiment was often repeated, and always with the same result. Tartar emetic dissolved in water, and rubbed on his hands, caused uneasy feelings and perspiration, but no action on the bowels, nor could he detect the presence of antimony in his urine. The application of a solution of jalap, or of rhubarb, or of gamboge, to the abdomen, invariably produced evacuations of the contents of the bowels; but the presence of none of them could be detected in the urine. When jalap was employed, however, it communicated its odour distinctly to the urine. His next experiment was with the oil of turpentine; and, to avoid the fallacy which might arise from breathing the air saturated with its vapour, he enclosed his hand in an oiled cloth bag, to which a long tube was attached, and passed out of the window; his arm was then secured in a jar, and oil of turpentine poured over it, and securely covered over. After a certain time the arm was removed from the jar, carefully washed, and he left the apartment and walked about in the open air, never having breathed the air of the room at all. The first urine passed after the experiment was over had a faint odour of violets, but that passed after the lapse of an hour or two had the odour much more strongly, and was very perceptible. He frequently repeated this experiment, and always with the same result. He was unable to detect the presence of ferrocyanate of potash in the urine after the arm had been immersed in a solution of that salt.

Dr Madden also made a few experiments on the lower animals, as on frogs and water newts, with the solution of opium, and on the rabbit with decoction of tobacco; carefully confining the application of these agents to the skin. The poison killed the animals to whose surface it was applied. Nux-vomica had, however, no action on pigeons when applied to the skin. The essential oil of bitter almonds applied to the axilla of a rabbit, and secured there by oiled cloth and a bandage, killed the animal in about an hour with all the usual symptoms of poisoning by that agent. Another rabbit, and a pigeon were also killed in the same manner, care being taken to prevent, as far as possible, the breathing of its vapour.

These experiments, as well as the long list he quotes from the works of other experimenters, appear quite satisfactory as to the skin possessing the power of absorbing medicinal agents when applied to it in a fluid state, and of introducing them into the circulation.

The absorption of gases and vapours by the skin, though not so capable of demonstration as that of the solids and fluids, is yet shown to take place. He refers to the experiments of Reaumur, Humboldt, Dumeril, and Edwards, on the lower animals, which prove that even after the removal of the respiratory apparatus, oxygen was abstracted from the air in which they were confined; a circumstance which could only be explained on the supposition of its being absorbed by the skin. The experiments of the Count de Millet, Cruickshanks, Gattoni, Abernethy, and others, are also quoted, showing that when a limb is confined in a limited space of air, oxygen is absorbed, and a quantity of carbonic acid thrown off; and although other experimentalists have failed to observe the same facts, Dr Madden justly remarks, that this is no proof that such a change does not take place, and this for many reasons; besides, that "a positive result is of far greater importance than any negative ones."

In furtherance of his proofs of the skin absorbing gases, he mentions the effects which have been found to be produced by the immersion of a limb, or the whole body, in vessels containing carbonic acid, or sulphuretted hydrogen gases; and as these are experiments which have been often repeated, and the author's own experiments lead to the same conclusion as those of other experimentalists, there cannot remain a doubt as to their having acted on the system through means of the skin.

This part of the author's essay is concluded by some short remarks on the well-known influence of medicinal substances applied to the body in the form of vapour. Mercury, sulphur, and camphor, are the chief agents enumerated; but from the imperfect manner in which the recorded experiments have been performed, they are not so satisfactory as could be desired, as care was not taken to preclude the inhalation of the vapour.

The subject of endermic absorption is very shortly treated, as it is so well-known, and generally employed at the present day, as a means of introducing remedial agents into the system. It is besides unnecessary to enlarge upon it in this place, as a full account and review of this mode of applying remedies will be found in the thirty-first volume of this Journal.

Dr Madden has not been able to arrive at any satisfactory conclusions as to the agents by which absorption is affected, as the experiments performed with the view of elucidating this subject only show that, if they can be considered as proving anything, they would certainly appear to favour the opinion that this function is carried on by simple imbibition, or by a process analogous to that described by Dutrochet, under the name of endosmose and exosmose. The author's views are given as follows:

> "For my own part, then, although I must acknowledge that my views are by no means decided, yet, from all that I have seen, read, and thought upon the subject, I am inclined to believe that the first step of the process, the first link in the chain of action, consists in endosmosis; that the matters thus introduced beyond the most external laminæ of the epidermis, find their way partly into the sudoriferous ducts lying within its substance, and are absorbed by the vessels of their coats, (for these ducts bear every appearance of being regularly organized, and it is therefore most consistent with

analogy to believe that they also possess vessels, though of so extreme a minuteness as to be invisible to the eye, even when assisted by powerful microscopes), and, partly by a continuation of the original process, permeate through the entire substance of the cuticle, pass through the coats of the subjacent plexus of vessels, both lymphatic and sanguiferous, and thus reach their ultimate destination."—Pp. 144–5.

The author, in conclusion, says a few words on the peculiar advantages which the external application of remedies possesses over their internal administration; the superiority consisting in this, that remedial agents may be thus applied immediately to the affected part; that they can be thus used when their internal administration is impossible, or would be followed by violent irritation; that their application is not attended with feelings of nausea or disgust; and that their action is more uncomplicated and unobscure.

Such is a short account of Dr Madden's essay; an essay replete with valuable information, and containing a collection of facts which renders the evidence on the absorbent powers of the skin very conclusive.

ART. V.—*On Granular Degeneration of the Kidneys, and its connection with Dropsy, Inflammation, and other Diseases.* By ROBERT CHRISTISON, M. D. F. R. S.E., President of the Royal College of Physicians of Edinburgh, &c. Edinburgh, 1839. 8vo. Pp. 288.

THE readers of this Journal, it is almost superfluous to remind, of the happy generalization of Dr Bright of the connection between albuminous urine and a specific disease in the texture of the kidneys. The account of the researches of this author, given in our thirtieth volume, in 1828, and the subsequent communications illustrative of the same subject by Dr Christison and Dr Gregory in our thirty-second (1829), and thirty-sixth volumes (1831 and 32), constituted the earliest contributions, demonstrating the constant connection between the albuminous state of the urine in granular degeneration of the kidneys.

Since that time, the subject has attracted the attention of a considerable number of practical observers, either as a state of the system ensuing upon scarlet fever, or taking place as a primary affection. Among contributions to the illustration of the subject in the former point of view may be mentioned the papers of Mr G. Hamilton, Mr William Wood, and Dr Stark in this Journal; and among those of the latter order, we must class the paper of Dr Mateer, also in this Journal, the essay of Dr Osborne, and the second essay by Dr Bright in the Guy's Hospital Reports, both reviewed in the forty-sixth volume of the same Journal; and at a subsequent period the volume of M. Martin Solon, and the elaborate and magnificent work of M. Rayer.

It is remarkable that, notwithstanding all that has been done by these several authors to extend, to confirm, and to rectify the results obtained by Dr Bright, on the connection between granular disorganization of the kidney, and the presence of serous or albuminous urine, many respectable practitioners, otherwise well-informed, seem still to entertain doubts regarding the constancy of the connection, and are disposed to look on the whole subject as one greatly too fanciful and refined for practical use. This incredulity, which proceeds partly from indolence and partly from ignorance, produces its usual effects; and we have frequent occasion to observe cases of dropsy, inflammation, chronic vomiting, or diarrhœa, or general bad health and debility, or even lethargy, treated in the usual routine manner, but all of which had depended on disease of the kidney. It cannot be denied that even the most perfect knowledge of the pathological causes of a disease does not invariably insure efficient and successful treatment. But if this be urged as an objection to correct and just views on the true causes of impaired health, it must be answered, that if such knowledge do not always insure successful therapeutic methods, it at least prevents the practitioner from following blind empiricism, and thereby, perhaps, adopting modes of treatment, and remedies, which, instead of being simply harmless, may prove extremely detrimental.

Perhaps much of the indifference to which we now advert, is to be ascribed to the circumstance, that hitherto the information communicated on the subject of disease of the kidney has not been placed in that tangible, concentrated, and accessible shape in which it becomes most agreeable to those engaged in the drudgery of daily practice. The works of Dr Bright and M. Rayer are not suited for the great body of the profession; few of whom have leisure or opportunity for studying the elaborate details given by the latter writer.

The present work is extremely well calculated, both to convey the requisite information on the pathological characters and effects of this disease, and at the same time to direct the attention of medical practitioners to those characteristic symptoms which denote its presence, both in the early and in the confirmed stage, and thereby prevent it from being confounded with other complaints, or overlooked at a period when treatment might have been beneficial.

The readers of this Journal are aware, that several of the cases of this disease which had occurred in the practice of Dr Christison, he communicated to the late Dr James C. Gregory. These cases are republished in the present volume, with several others, and a great deal of additional information.

Dr Christison divides his work into six sections; the first on the morbid anatomy and pathology of the disease; the second on the symptoms and morbid changes of the blood and urine; the third on the various secondary diseases, observed to take place in persons labouring under disease of the kidney; the fourth on the causes of the disorder; the fifth on the prognostications; and the sixth on the method of treatment. This occupies rather more than one-half of the volume; and the rest of it is occupied with illustrative cases, followed by such epicritical remarks on pathology and treatment as the circumstances of the cases suggest.

We do not propose to enter into a minute account of the whole of these sections, which the limits of this notice will not permit. All that we propose to do is, to direct the attention of the reader to the principal points which are either new or important.

The subject of the morbid anatomy of the diseased kidney, as well as that of the general symptoms of the disorder, has been so often considered in the pages of this Journal, that upon these we shall not at present dwell. The state of the urine also has been so frequently considered, both by Dr Christison and Dr Gregory, that there is scarcely anything additional to state upon that subject; but to one or two points it may be profitable to direct the attention of the reader.

It is known that the presence of albumen in the urine in the form of serum coagulated by heat, or the addition of nitric acid, and diminished density of that fluid, are the great pathognomonic characters of this disease; and in general they are sure and certain indications of its presence. It has been also supposed, that the quantity of albumen deposited upon the application of heat affords a correct indication of the degree and stage of the disorganization of the kidneys. The latter conclusions, however, are not altogether to be relied upon. Dr Christison shows, that, in many instances, the albumen is liable, from various causes, to diminish in quantity, and especially towards the close of the disease. It is important, therefore, for the practitioner to be aware of this circumstance in forming his prognosis, because the diminution or disappearance of the albumen from the serum might lead him to infer, that the disease was disappearing and the patient was recovering, when, in point of fact, it was advancing to the fatal termination. Conversely, the large proportion of albumen found in cases of disease of the kidney is not an exact indication of the extent or stage of the disease. The urine may contain a large proportion of albuminous matter in the early stage of the disorder, when the texture of the kidneys is affected only in a very moderate degree;

and this large amount may diminish or disappear under the use of proper remedies, where the tissue of the kidneys is still in the incipient stage, and but slightly affected.

These views, which are the result of a considerable amount of accurate observation, are rather at variance with what is stated occasionally by Dr Bright, and almost uniformly by Dr Osborne, M. Solon, and M. Rayer. Dr Christison suggests two modes of explaining this discordance. The first is, that it would be desirable to repeat the experiments as to the coagulability of the urine in the incipient, established, and terminating stages of the disorder, as there may have been some mistake on these heads. The second is, that, if the degree of coagulability be formed, as these authors think, to bear a relation to the degree and intensity of the disorder, there must be several varieties of the disease, or several diseases, which, at the same stage of the progress, are attended with various degrees of the renal irritation, characterized by the secretion of albumen.

The views above adverted to, as considering the degree of coagulability in the urine to be in exact relation to the degree of disorganization of the kidneys, are closely connected with that notion which represents the albumen as vicarious of the urea. Now, though it be true that the urea is sometimes diminished in quantity in granular disorganization of the kidney, yet the facts are not favourable to the idea, that its diminution is in the inverse ratio of the increase of the albumen. The most carefully observed facts, on the contrary, show that when the albumen is abundant, the urea is also abundant, and when the urea is scanty, the albumen is also scanty. Dr Christison, indeed, formerly showed, and the fact is confirmed by daily observation, that, under suitable treatment, the amount of albumen secreted may be very much diminished, and may even disappear, while the secretion of the urea is not restored.

The observations made on the value of the presence of albumen in the urine, as a diagnostic mark, deserve attentive consideration.

> "Some have appeared to me to imagine that the presence of granular disorganization of the kidnies may be known by the condition of the urine alone; and many more imagine that opinion is maintained by myself and others who have turned their attention to this branch of pathology. It is partly to correct such notions that I have dwelt so fully on the various properties of the secretion at different stages. Any one who peruses attentively what has been said, will perceive, that it must be sometimes impossible to rest the diagnosis on the state of the urine alone. In general indeed we may do so with confidence. For *first,* when the disease has continued for a short time with acute symptoms, the characters of the urine, namely, a somewhat reduced density, a diminished amount

of daily discharge of solids, and high coagulability, are invariable, and do not occur conjunctly so far as is yet known in any other disorder. *Secondly*, there is a very common conjunction of characters in the advanced stage, which has seemed to me never to occur in any other malady, namely, great reduction of density, some diminution of quantity, much diminution of the daily discharge of solids, and slight coagulability. *Thirdly*, another conjunction not less characteristic, perhaps, is great reduction of density, slight coagulability, and a great increase in quantity, consequently with little or no diminution of the daily discharge of solids. *Fourthly*, I have never in any circumstance, except in the advanced stage of granular disorganization of the kidnies, met with urine about the natural standard in quantity, of the very low density of 1006 or 1008, consequently defective materially in the daily discharge of solids, almost colourless, or cherry-red, or smoke-brown, or orange-yellow, and obscured by opalescent muddiness, which does not disappear under rest or gentle heat,—even although not coagulable. *Fifthly*, though not absolutely prepared to state the same proposition where the quantity of urine is superabundant, and its other qualities such as those last described, I am inclined to think this condition also characteristic. But there is another condition met with occcasionally which is common to this with other diseases,—namely, where the quantity is natural or abundant, the density low, the daily discharge of solids natural or under the healthy standard, the colour pale-straw yellow, without either coagulability or permanent muddiness. This is a state of the urine which we observe in many diseases, and which even seems natural to some persons in good health. It is also however compatible with the presence of granular disorganization of the kidneys; and it has seemed to me to occur in one of two remarkable circumstances,—either when the disease is checked in the early stage, and a cure is going forward,—or when the disease is in the advanced stage, but has arrived at a temporary suspension of its progress."—Pp. 55-57.

The most interesting part of the present discussion, however, is that which relates to the state of the blood in this disorder. On this subject, Dr Christison in his first paper published in the thirty-second volume of this Journal, communicated much interesting information. He ascertained that the serum in this disease is considerably less dense than natural; that it contains more or less urea capable of being demonstrated and separated by the usual agents; and that it is also often milky in consequence of the presence of oil. These results have been confirmed in the present essay, and several new facts have been added. Of these the most important, is the increase in the proportion of fibrin in the early stage of the disorder, and as the disease advances, a return of the fibrin to its normal proportions, but a great and conspicuous reduction in the amount of the hematosin or colouring matter.

"The proportion of fibrin in the blood is usually increased in the early stage. In healthy human blood I have found the proportion of dry fibrin to vary from 25 to 52 parts in ten thousand, according to the method of analysis I have generally pursued. In the early stage of granular disorganization of the kidnies I have seen it so high as 82 and so low as 30 parts. The variation has seemed to me to depend on the degree of general reaction or local inflammation which is present, and to be regulated, therefore, by the amount of buffiness of the blood. The proportion is accordingly often large, because at the period in question local or general reaction is not unfrequent."—P. 63.

It is important to observe, however, that at this stage, the proportion of hematosin or colouring matter is little if at all affected; and to this it is the more necessary to attend, because in the advanced stage it undergoes a great diminution, and upon this diminution, indeed, depend many of the phenomena of the disease.

" According to the late researches of *Lecanu*, hæmatosin constitutes on an average, 1160 parts in ten thousand of the female human blood, and 1325 parts in the male in a state of health. The lowest proportion I have obtained is 1207, in a stout young woman with recent insignificant pectoral complaints; and the highest is 1535, in a powerful seaman of a revenue cutter, 32 years of age, affected for a few days with paralysis of sensation, from which he speedily recovered. The mean of these results corresponds closely with what I have observed in the case of a stout man of 55, seven days after he had been seized with characteristic symptoms of granular disorganization in their acute form, while previously in a state of excellent health for five years. [Archibald Wright, No. 20.] In this instance the hæmatosin amounted to 1339 parts in ten thousand. I shall presently mention other instances where the proportion approached the healthy standard; but so exact a correspondence must not be often looked for, since we seldom meet with a case so recent in a subject previously healthy, and the effect of the disease in reducing the colouring particles is prompt and energetic.

" It follows then from these statements that the condition of the blood in the early stage of the disease is characterized by the low density of its serum and a defective proportion of albumen, by the frequent presence of urea, by the frequent increase of the fibrin, and by the proportion of the hæmatosin being unaffected. And in order to test its characters in these respects with accuracy, the precautions to be kept in view are, that the disease shall be really recent, not preceded, as the acute symptoms often are, by latent disorganization,—that there shall have been no marked state of precursory ill-health from other causes,—that, in particular, blood-letting shall not have been practised recently before,—that the urine shall be under the natural standard in point of quantity,—and that symptoms of reaction shall be present. The last two conditions are the circumstances which regulate the presence of urea, and the increase of fibrin.

"As granular disorganization advances, important changes occur in the pathological state of the blood now laid down. *In the first place,* the blood usually separates into a more abundant serum and less bulky clot. The serum is commonly not so lactescent. The clot less frequently presents the buffy coat; yet this appearance is always seen whenever incidental reaction occurs; and I have also seen it well-marked in the very advanced stage, although there was neither any general reaction nor apparent local inflammation. Where the buffy coat does present itself, the clot is remarkably small and contracted; so that it sometimes forms scarcely a fourth part of the whole weight of the blood.—*In the next place,* the density and solid contents of the serum, which have been shown above to be invariably much reduced in the beginning of the disease, gradually return to the healthy standard, or even exceed it. In the middle stage the serum may be often met with of rather low density, such as 1025 or 1024; and this state is always found to concur with considerable coagulability of the urine. Sometimes too, even in the most advanced stage the density is reduced as low as it ever is at the commencement, provided incidental reaction occur and thus render the urine highly coagulable. But the ordinary course is for the density and solid contents to be restored as the disease advances; and this restoration keeps pace with the gradual diminution and disappearance of albumen from the urine. In the middle stage, when the density is about 1024, the proportion of albumen and salts of the serum amounts to 630 or 660 in ten thousand parts of blood. In the most advanced stage, where there was no reaction and very little coagulability of the urine, I have seen the density of the serum 1031, and the proportion of its salts and albumen to the entire blood so high as 973 in ten thousand parts. This is above the healthy standard, which, according to Lecanu, varies between 780 and 800,—and according to my own experiments between 816 and 853. In the same stage, in a case where general reaction and pleurisy had supervened, the density of the serum was 1021, and the solids of the serum amounted only to 583 parts in ten thousand of the blood. *In the third place,* the urea frequently disappears from the serum of the blood as the disease advances; but in the most advanced stage it commonly reappears, and it is sometimes present towards the close in larger proportion than ever. The cause of these variations is apparent: The urine in the middle stage, though defective in the proportion of solid ingredients, is often not so in the total amount of them discharged daily; because though low in density, it is frequently decreased in quantity: But as the disease draws towards a close, the quantity increases as well as the density; and at length sometimes there is an almost total suppression. Here in short, as in the early stage, wherever there is a material reduction of the daily discharge of urea, it may be distinctly found in the blood; but not otherwise.—*In the fourth place,* the fibrin is most usually natural in its proportion after the early stage is passed, and it becomes abundant only when reaction incidentally recurs, and when the blood is decidedly buffy. In the middle stage I have found it so high as 85 parts in ten thousand of the blood, reaction being present; in the advanced stage in the like circumstances I have met with it forming 56 parts; and in both cases there was a very thick and strong buffy coat. In other circumstances it usually amounts to between 27 and 43 parts.—*Lastly*, by far the most remarkable character of the blood in the advanced stage of the disease is a gradual and rapid reduction of its colouring matter or hæmatosin. At the commencement, as already pointed out, this ingredient undergoes little or no diminution. But in the progress of time its proportion sinks; and at length it is reduced so much as to form less than a third of the healthy average. The effect of the disease in this respect is apt to be complicated with that of occasional blood-letting, which has a very great influence in reducing for a considerable length of time the proportion of colouring matter in the blood. But the reduction which takes place in granular disorganization of the kidnies is far beyond what can be accounted for by the extent to which blood-letting has been usually carried; and besides is found to be excessive where no blood had been lost at all previous to that which is analyzed. I am acquainted indeed with no natural disease, at least of a chronic nature, which so closely approaches hæmorrhage in its power of impoverishing the red particles of blood."—Pp. 64–70.

"Thus then, in the advanced stage of granular disorganization, the proportion of hæmatosin in the blood is invariably and greatly reduced; no other morbid change is invariably occasioned; but frequently the solids of the serum are also defective, sometimes on the contrary in excess; and not unoften, especially if the disorder is very far advanced, the serum likewise contains urea."—P. 72.

This change in the constitution of the blood is so much the more remarkable, that it is one of the principal causes, if not the sole cause of the peculiar pale waxy complexion which is one of the most uniform external symptoms of the disease, both before and after the supervention of dropsical infiltration.

The change in the structure and the corresponding disorder in the function of the kidney now mentioned, may, and does give rise to various secondary diseases, the consideration of which forms the subject of the third section. The most usual of these, it is known, is dropsical infiltration of the cellular membrane, and at length within most of the serous membranes. Next come dyspepsia and chronic vomiting; diarrhoea; pleurisy and peritonitis; catarrh and bronchial inflammation; lethargy, coma and apoplexy; rheumatic disorders; disease of the heart; and disease of the liver; prevailing in frequency nearly in the order now mentioned. Though any of these complaints may take place separately, in persons labouring under disease of the kidnies, yet two or more of them may take place conjointly. Thus with dropsy there may be associated pneumonia, pleurisy, and bronchitis. With dropsy also may be associated vomiting and diarrhoea; and it is very common for the disease to terminate its career by coma or apoplectic symptoms.

The frequency of vomiting alone or with diarrhoea in this distemper is very great; and though not attempted to be numerically estimated by Dr Christison, he shows what is his experience of its frequency by placing it next to dropsical effusion. Within the sphere of our own observation it has been so common, that few cases have proved fatal without its occurrence; and very often it has alternated or been conjoined with diarrhoea. Dr Christison has found this symptom to be as little amenable to medical treatment, as it has proved in the hands of other physicians. It is indeed a most unfavourable and unmanageable symptom, and while it too often resists all remedies, it generally indicates that the fatal termination of the disease is not very remote.

Diarrhœa or frequent attacks of looseness are also a common symptomatic effect of disease of the kidnies. The author regards it, in one class of cases, as dependent on mere inordinate irritability and increased discharge of the mucous secretion, and in another as originating in dysentery, that is, inflammation of the intestinal mucous membrane, and associated eventually with ulceration. In the latter case it is generally an exhausting and enfeebling disorder, which, though susceptible of temporary palliation, recurs repeatedly, wearing down the strength of the patient, and contributing to bring him to the grave. Dr Christison justly remarks, that, though the symptom is not noticed as very prevalent in renal disease in London or Paris, it is one of the most common and obstinate of the secondary disorders among the cases treated in this city. We have seen it even recur in fits, as it were, for a considerable time in patients, long before the presence of disease of the kidney, on which it evidently depended, was recognized; and though it was susceptible of temporary cure in that stage, it generally recurred until, either by itself, or by the supervention of dropsical effusion or coma, the patient is destroyed.

The great practical use of the knowledge of the facts now mentioned is, that whenever diarrhœa comes on repeatedly, and becomes as it were habitual, and whenever a patient is affected with chronic vomiting, the practitioner should consider whether these symptoms do not depend on the presence of granular disease of the kidney. It is curious to observe how often both symptoms are treated as primary affections by many practitioners, when the urine is albuminous and low in density, and the patient wasting daily by the gradual advancement of organic disease in the kidney.

Coma or lethargy, or apoplectic stupor, or even epilepsy, is also another effect of this disease, which is often taken as a primary disorder, while the renal disease, its true cause, is overlooked. The experience of the author does not allow him to agree in the conclusion adopted by Dr Osborne, that these symptoms are in many cases dependent on a low form of *arachnitis*, (Edinburgh Medical and Surgical Journal, xlvi. p. 196.) There are probably different varieties of this cerebral affection; but the one most common is distinguished by a peculiar state of the breathing, which is slow and languid, sometimes not more than eight or ten in the minute, and performed with long intervals of rest. The symptom takes place at the close of the disorder, and is invariably fatal.

A remark of the author, that "several instances of coma and suppression of urine have presented themselves where the true origin of the disease was not suspected during life, but was discovered in the dead body," shows how easily practitioners may overlook the true cause of certain symptoms. The practical inference to be deduced from this circumstance is, that in every case of stupor, with slight headach, and where drowsiness is urgent, the urine ought to be instantly examined. The suspicions of the practitioner may be often roused, by observing the urine scanty, or suppressed, or the surface of the body beginning to exhale a urinous odour.

The treatment of this disease has been hitherto very unsuccessful. In short, considering the effects of the disorder on an important function, and the diminution or suppression of a secretion which is so necessary to the well-being of the animal economy, it is not astonishing that treatment should be often inefficient. Dr Christison distinguishes the treatment into that suited to the primary disease, and that required by the secondary affections.

In the early stage, he recommends antiphlogistic measures, and especially general blood-letting, in order to diminish the force of the general circulation, and after this has been accomplished, local depletion, by means of cupping from the loins, or the application of leeches to the epigastric and umbilical region of the abdomen.

After the sufficient employment of these measures, revellents, in the shape of blisters, issues, and setons to the loins are recommended. At the same time, the general antiphlogistic regimen as to diet, exercise, and the mode of life, must be scrupulously observed. The surface of the body ought also to be kept in a warm, and, if possible, moist and perspirable condition.

With the latter view, Dr Christison recommends the use both of flannel clothing and diaphoretic medicines, though in the use of the latter, his experience does not allow him to repose the high degree of confidence claimed for them by Dr Osborne. While he allows the general beneficial influence of the diaphoretic treatment as a curative method, he has not seen from it those frequent beneficial results, which we are led to expect from the panegyrics bestowed on it by Dr Osborne.

Dr Christison entertains not less doubt on the supposed hurtful effects ascribed by the same author to the use of diuretic medicines. Dr Christison only goes the length of discarding the use of diuretics in the early stage of the disease, under certain limitations. He has seen no reason for believing that their use tends to increase the granular deposit in the kidnies, either in the early or the advanced stage; and in the latter he allows their employment, especially for the removal of the secondary affections.

Of the use of the mercury, he disapproves in general, as an agent rather hurtful than otherwise, especially in large quantity. But he thinks its use in small doses is not inconsistent with good pathological principles.

Its extreme readiness and promptitude in affecting the mouth he allows, and has often witnessed; and would not administer the mineral in a manner such as to produce that effect, if it could be avoided. From the recommendation of M. Solon, that it may be used in the early stage for checking the primary morbid action, he sees no satisfactory grounds.

In the treatment of the secondary disorders, Dr Christison recommends, for the removal of anasarca diuretic medicines rather than purgatives; and among diuretics, foxglove and bitartrate of potass. For vomiting, antacids and opiates with blisters to the pit of the stomach are recommended; and for diarrhœa, opiates and astringents, especially acetate of lead and opium, with regulated diet. The other affections are to be treated by their appropriate remedies,

In conclusion, this volume on Granular Disorganization of the Kidnies, may be confidently recommended to the practitioner, as sufficiently comprehensive for all practical purposes, without being tediously minute, and of all the works on the subject yet published, by far the most remarkable for the precision and accuracy of the information communicated.

ART. VI.—*An Atlas of Plates illustrative of the Principles and Practice of Obstetric Medicine and Surgery, with Descriptive Letter-Press.* By FRANCIS RAMSBOTHAM, M. D. Member of the Royal College of Physicians, &c. Nos. 1, 2, 3.

THE small number of the parts of this work yet before the profession is unfavourable to the formation of a decided opinion on its merits. It is, nevertheless, proper to say, that, so far as it has hitherto proceeded, it holds out good promise that it will, when completed, be a good and useful publication. The wood-cuts are extremely well done, and reflect much credit on the artist. In the copperplate engravings, Dr Ramsbotham has been at great pains to give instructive views of the bones and other parts represented. The views of deformed spine and *pelvis* are interesting.

In the descriptive part, Dr Ramsbotham gives very correct accounts of the parts concerned in the functions of reproduction; and, upon the whole, the specimen of the work published shows that it deserves the patronage of the profession:

PART III.

MEDICAL INTELLIGENCE.

ANATOMY AND PHYSIOLOGY.

On the Structure of the Cortical Layer of the Convolutions of the Brain. By Dr **Baillarger.** (*Séances de l'Academie de Medicine.* 21st Jan. 1840.)—M. Baillarger has studied the structure of the cortical layer of the brain of man and the lower animals, both in the adult and in the fœtus, and has arrived at the following conclusions.

1. In the brain of the Mammalia, the gray cortical substance is formed of six alternately gray and white layers extending from within outwards. When a thin layer of the gray substance is examined as to its transparency, between two plates of glass, the six layers appear to be alternately transparent and opaque.
2. The central white substance, especially at the summit of the convolutions, is united to the cortical layer by a great number of fibres.
3. The two white layers which exist in the thickness of the gray cortical substance are formed of two series of vertical fibres.
4. Among these fibres some are only reflections of those which come from the central white mass of the brain; others, however, appear to be proper to the intermediate layers.
5. There is in the cortical layer of the brain of the lower Mammalia, a second order of transverse fibres, which cross the first at a right angle, and form with it a kind of net-work.
6. The sixth, or most superficial layer of the gray cortical substance, can be occasionally isolated.
7. This superficial layer of the brain differs from the gray substance immediately subjacent to it, by its possessing a whitish tint, and its frequent opacity.
8. The cortical layer exists, and can be demonstrated in the brain of the fœtus.
9. The *pia mater* does not secrete the cerebral substance by successive layers, as Reil, Tiedemann, and Desmoulins have stated.
10. The stratified structure noticed in the brains of the Mammalia is not found in the cerebral lobes of birds, of reptiles, or of fishes. It is, however, met with in the optic lobes, as M. Serres long ago pointed out.
11. The partial pathological colorations in layers of the gray substance which are occasionally observed, are explained by its structure.
12. The superposition of six layers, alternately gray and white, in the gray cortical substance of the brain, suggest the idea of a galvanic pile.

On the Incubated Egg.—By **Joseph Towne**, Esq.—(*Guy's Hospital Reports*, October 1839.)—Many curious facts are stated by Mr Towne at variance with the received notions of the uses of many parts of the contents of the egg, and totally subversive of all the usual theories of the decarbonization of the blood of the chick. Mr Towne makes no attempt to explain the occurrence of the phenomena he describes, but confines himself to a simple but clear statement of what came under his own eyes.

It is commonly believed that, during incubation, the blood of the embryo chick is decarbonized by passing through a membrane, called the chorion, which is nearly in contact with the lining membrane of the shell, and which is supposed to be under the influence of the external air through the pores of the shell. The space at the larger end of the egg, the *folliculus aëris*, is supposed to aerate the embryo till the chorion is sufficiently developed to perform that function.

Mr Towne, however, was led to doubt whether this was the true function of either, by observing that the lining of the egg, a very few hours after incubation, instead of being, as in the fresh egg, thin, semitransparent, and easily torn, was studded over with minute chalky points, which, after a longer time had elapsed, increased so as at last to convert it into a dense white membrane, close in its texture, and somewhat like fine parchment. In fact, as incubation advanced, and the necessity for the decarbonization of the blood became greater, the greater obstacle appeared to be thrown in the way of its taking place.

He examined eggs again and again, and always with a similar result; and the same he noticed in the eggs of the linnet, sparrow, blackbird, moor-hen, partridge, turkey, duck, and goose; and the thickening of the internal lining membrane, in all these instances, bore an exact proportion to the size of the egg.

Varnishing an egg has always been asserted to prevent incubation; but as Mr Towne thought this might depend more on the substance used in killing the embryo, than on the mere fact of the air being excluded, he covered several eggs with thick coats of albumen, alternated with carefully applied layers of paper steeped in albumen, till four layers of paper were layed on, and as many covering coats of albumen. The ingress of air was thus perfectly prevented, and the eggs were in this state submitted to incubation.

These eggs were opened respectively on the fourth, fifth, sixth, seventh, eighth, ninth, and tenth days, and their appearances found to correspond entirely with other eggs which had not been thus treated. The chicks had gone through all their changes without interruption, nor could the slightest difference be detected between them and eggs hatched in the usual way.

One egg thus varnished was opened twelve and a-half days after incubation was commmenced, and the venous and arterial circulation was most beautifully developed. One of the eggs was allowed to remain till the nineteenth day, when the chick was found lively and vigorous, and evinced a strong disposition to escape from its shell.

When these eggs were opened, no change was produced on the blood by the contact of the air so long as vitality remained, and the chorion was entire, as the blood was seen to leave the chick of the venous hue, assume its arterial colour in its circulation through the chorion, and return thus to the chick; but as soon as the circulation ceased, and the vitality became extinct, both venous and arterial blood assumed the same bright hue, in consequence, probably, of the action of the air.

The process of incubation went on even when five coats of paper dipped in albumen, and three coats of oil paint had been given to the egg.

Mr Towne next endeavoured to ascertain the use of the *folliculus aëris*, and what day of incubation it is ruptured. To ascertain this he removed a portion of the shell from the small end of the egg, and extracted the chick through the aperture; a pair of forceps then easily removed the chorion. A small aperture was then made in the larger extremity of the egg, and, by gently blowing in, it was at once apparent whether the folliculus was ruptured or not. He observed that no rupture had taken place up to the eighteenth day, and that, up to that time, the chick had not the power of using its vocal organs; but, on the nineteenth day, so soon as the forceps were introduced, the chick uttered a loud note of distress, and the folliculus was found to be largely ruptured. Mr Towne thence infers, that the air contained within the folliculus cannot be used for the decarbonization of the blood before the nineteenth day; and that its use then is to aerate the blood till the chick can effect an opening through the shell. He thinks this is the more probable, as the umbilical vessels, which have hitherto conveyed the blood to the chorion, are at this period beginning to shrink, and becoming incapable of performing their original function.

Mr Towne describes the *membrana albuminis* as composed of two layers, which are in contact with the shell throughout its whole extent, and do not separate to form the *folliculus aëris*. The air space he describes as being formed by a distinct membrane which lines the *membrana albuminis*, and separates from it during incubation. It does not undergo the same changes as the *membrana albuminis*, and may be easily shown by the process mentioned above for detecting the integrity of the air follicle.

He describes a spiral filament contained in the chalazes, the elasticity of which is so justly proportioned to the force by which the yelk is borne up, as to restrain it at a certain point, allowing sufficient space for the white to lubricate the surface of the yelk, and thus protect the germ from injury.

The mode in which the albumen becomes mixed with the yelk is minutely described. In the hen's egg, between the third and fourth day of incubation, an opening takes place in the yelk-bag directly opposite the chick, the thin white passes through this and mixes with the yelk, whilst the thick sinks to the bottom, becomes more dense, and securely seals the opening. The opening, at first large, soon becomes surrounded by a vessel which contracts it, and the thick white is gradually received within the yelk-bag, until the thirteenth or fourteenth day of incubation in the hen's egg, by which time the white has nearly all passed into the yelk-bag, and the opening has become closed.

The whole of the condensed white may easily be removed in a mass, having the consistence of thick isinglass-jelly. Mr Towne thinks it possible that, in addition to performing the functions of a plug to the opening of the yelk-bag, it may also, by its superior gravity, always sink to the bottom of the egg, however it may be turned, and cause the embryo, which is precisely opposite, to rise towards the higher side.

The vessels which contain the yelk for the nourishment of the chick, he has been able to detect as early as the formation of the blood-vessels; on the fourth day they were perfectly distinct. A bubble of air was introduced below the embryo, between it and the yelk, and the vessels were at once evidenced.

On the Granular bodies of the Colostrum. (*Archives Generales de Medecine*, April 1840.)—M. Donné, in his memoir on Milk, remarked the presence of particles in the colostrum, which had no resemblance to the ordinary milky globules. They differed in their form, size, general aspect, and internal composition. These bodies were nearly transparent, and seemed to be composed of a multitude of small grains united together, or inclosed in a transparent envelope. They disappeared in ether; and when this fluid was evaporated there was left on the glass small tufts of acicular crystals. These bodies were found in the milk for more than twenty days after delivery.

M. Simon at first contradicted these observations, having failed to discover these bodies in the milk of three women; and he asserted that the whole must have been the effect of an optical illusion. He shortly afterwards, however, found reason to change his opinion, (Muller's Archives, 1837, p. 187,) and agree with M. Donné; probably from his becoming better acquainted with the use of the microscope. He endeavoured, however, to throw doubt on M. Donné's assertion, that they always existed in the colostrum and were characteristic of that fluid. These doubts, however, merely rest on the fact of his not having been able to discover them in the first three cases he examined. He mentioned that he has seen these granular bodies disappear in from eight to fourteen days after delivery.

M. Gueterbock recognized these bodies, and described them as being surrounded with a membrane. He thought he recognized this membrane after having dissolved the granular contents of it by means of ether.

M. Mandl, who has last taken up the subject, says that these bodies ought not to be considered as products of organic secretion, as all organic products have a determinate and regular form. He considers them rather as agglomerations of the molecules or granules which are floating in the serum of milk; and that this is still further proved by the circumstance, that occasionally a true milk globule is found imprisoned within one of these granular agglomerations. The elementary molecules, he says, are occasionally not to be recognized, but the granular body in that case presents a striated appearance.

Experiments on the Action of the Heart. By C. W. Pennock, M.D. of Philadelphia, and E. M. Moore, M. D. (*American Journal of the Medical Sciences.* February 1840.)—From sixteen carefully conducted experiments on sheep and calves, regarding the action and sounds of the heart, Drs Pennock and Moore have arrived at the following conclusions:

1. The impulse is synchronous with, and caused by the ventricular contraction; and, when felt externally, arises from the striking of the apex of the heart against the thorax.

2. The expulsion of the blood from the ventricles is effected by an approximation of the sides of the heart only, and not by a contraction of the apex towards the base; during the systole, the heart performs a spiral movement, and becomes elongated.

3. The ventricle contracts, and the auricle dilates at the same time, occupying about one-half of the whole time required for contraction, diastole, and repose. Immediately at the termination of the systole of the ventricle, its diastole succeeds, occupying about one-fourth of the whole time, synchronous with which the auricle diminishes, by emptying portion of its blood into the ventricle, unaccompanied with muscular contraction. The remaining fourth is devoted to the repose of the ventricles, near the termination of which the auricle contracts actively, with a short, quick motion, thus distending the ventricles with an additional quantity of blood; this motion is propagated immediately to the ventricles, and their systole takes place, rendering their contractions almost continuous.

4. From the termination of their diastole to the commencement of their systole, the ventricles are in a state of perfect repose, their cavities remaining full, but not distended, while those of the auricles are partially so, during the whole time.

5. The sounds are produced by the motions of the heart or its contents, and not by striking against the thorax, as proved in all the experiments; being much louder when the stethoscope was applied directly to the heart, than when to the chest, or with the lungs interposed.

6. The sounds are more distinct when the muscle is thin, and contracts quickly. Hence the clear flapping character of the first sound over the right ventricle, as compared with the left.

7. The first sound, the impulse, and the ventricular systole were synchronous. This sound may be a combination of that caused by the contraction of the auricles, the flapping of the auriculo-ventricular valves, the rush of blood from the ventricles, and the sound of muscular contraction.

In some of the experiments, when the heart was removed from the body, the ventricles cut open and emptied of their contents, and the auriculo-ventricular valves elevated, a sound was still heard, resembling the first sound of the heart, but was apparently owing to muscular contraction. The valves appeared to aid but slightly in the production of the sound.

8. The second sound is caused exclusively by the closure of the semilunar valves, from the reaction of the arterial columns of blood upon them, in its tendency to regurgitate through the aortic and pulmonary orifices. This is proved by the greater intensity of this sound over the aorta than elsewhere, the blood having a strong tendency to return through the valvular opening; by the greater feebleness of the sound over the pulmonary artery, which is short, and soon distributes its blood through the lungs, thus producing but slight impulse upon the valves in the attempt to regurgitate; by the disappearance of the sound, when the heart becomes congested, and contracts feebly; and finally, on account of its entire extinction when the valves of the aorta were elevated.

9. The second sound is synchronous with the diastole of the ventricle.

PATHOLOGICAL CHEMISTRY.

On Pathological Secretions in general. By Dr MARCHAND. (*Muller's Archives*, March 1839.)—Dr Marchand has published the results of his analysis of the matters of diseased secretions. " The inorganic elements," he says, " are always the same, unless some accidental external influence should cause any variation." Iron is always met with, but never copper, manganese, or tin. This last substance he has never detected in the blood, though some have affirmed that it exists there. Ammonia is always present; and potash less frequent than soda. Phosphoric acid is often found in considerable quantities; traces of fluoric acid he had only twice seen, once in a case of ascites, and again in a case of dropsy of the ovary. Lactic acid is always in combination with bases. It must be understood that these constituent parts exist in no regular proportion, their quantities depending on the relative activity of the secretions of urine and of sweat.

The analysis of the organic elements is much more difficult. They are constant but very variable in quantity. Albumen exists in different proportions from .50 to 14.00; but when it reaches this last mentioned amount it so envelopes the other ingredients, as to render their detection extremely difficult. Albumen possesses the peculiar property of concealing the presence of fatty and colouring matters, urea, &c. Fibrine has never been detected by Dr Marchand in pathological secretions.

Among the constant organic elements are found different fatty matters. Phosphoric fatty matters have been met with in medullary sarcoma. Cholesterine is of common occurrence; it has been detected in biliary calculi, in the bile of the ox, in the human brain, in medullary sarcoma, in the secretions from hydrocele, and in that of hydrocephalus. Salivine is very rare; but various colouring matters are common.

Dr Marchand adds, that he has made several experiments on the combination of corrosive sublimate with albumen; and he has arrived at the conclusion, that it contains neither calomel nor sublimate, but an oxide of mercury; a fact which explains the presence of a free acid.

MATERIA MEDICA.

On Quinine.—By M. H. MAGOUTY.—(*Journal de Medecine Pratique de Bordeaux*, Nov. 1839.)—An accidental circumstance led M. Magouty to study the action of the ammoniacal salts on quinine at different degrees of temperature; and the following are the results to which he has arrived.

1. That quinine is more soluble in water than is generally imagined and more so in hot than in cold water.

2. That quinine becomes anhydrous even when in water of the temperature of 60° Cent.

3. That quinine can be easily obtained in a crystallised state from its watery solution; but that it is only with difficulty that crystals are got from an alcoholic solution.

4. That ammonia, without the aid of heat, only partially decomposes the salts of quinine, as they do also those of magnesia, but that ammoniacal salts are decomposed by quinine, if aided by a temperature equal to that of boiling water.

On the Conversion of Calomel into Corrosive Sublimate.—By M. Mialhe.—(*Journal de Pharmacie*, Feb. 1840.)—A physician had prescribed to a child a few powders, containing in each five grains of the muriate of ammonia, five grains of sugar, and half a grain of calomel. After taking a few of these the child died, with all the symptoms of poisoning by corrosive sublimate; and the apothecary was charged with the death of the child, on the supposition that he had substituted corrosive sublimate for the calomel. Experiments were instituted to ascertain, whether the calomel could have been decomposed by the ammoniacal salt; and it was satisfactorily proved by M. Peten-Koffer, that a portion at least was converted into corrosive sublimate. A celebrated French professor of chemistry, however, denied that such an action took place; and M. Mialhe repeated with great care the experiments, and arrived at the following important conclusions.

1. The proto-chloride of mercury (calomel), when mixed with muriate of ammonia, or the chlorides of sodium or potassium, and distilled water, is partly converted into the deuto-chloride of mercury (corrosive sublimate), and partly into metallic mercury. This decomposition takes place at the temperature of the human body, and even at ordinary temperatures, in the course of a few instants. In order to be convinced of the truth of this, it is only necessary to have in the mouth for a few minutes a small quantity of calomel; a pretty intense mercurial taste is soon developed, due to the mutual reaction of the mercurial chloride, and the alkaline chlorides contained in the saliva.

2. It is to the conversion of calomel into corrosive sublimate and metallic mercury, when acted upon by the hydrochloric acid or hydrochlorates, or ammoniacal salts which exist in the digestive tube, that we must attribute the pathological phenomena of mercurial salivation, when calomel has been administered internally. What proves that such is really the case, is the fact, that when calomel does not purge, but is tolerated by the digestive organs, it excites an abnormal secretion of saliva, and this on account of the larger quantity of sublimate which is formed.

3. As the quantity of sublimate formed within the body depends on the quantity of alkaline chlorides met with in the intestinal canal, those who habitually use large quantities of salt, all other things being equal, ought to be more easily salivated than others.

4. The antisyphilitic properties of calomel are probably due entirely to the corrosive sublimate and metallic mercury into which it is converted. Without doubt its anthelmintic virtues are owing to the same cause; the two substances into which it is converted acting as a poison on the intestinal worms.

5. What has been said of calomel is equally applicable to the proto-ioduret of mercury; it being, in the same circumstances, converted into the deuto-ioduret.

Mode of preparing the Lactate of Iron.—By M. Louradour.—(*Journal de Pharmacie*, March 1840.)—Lactate of iron, which is considered as the most useful and efficacious of the ferruginous preparations, by MM. Fouquier, Bally, Bean, Rayer, Nonat, Bouillaud, Gelis, and Conté, is prepared in the following manner. Whey is set aside and allowed to ferment, when a very large quantity of lactic acid is formed. It is then evaporated to a fourth of its bulk, filtered, and saturated with milk of lime, when an abundant precipitate falls, consisting chiefly of calcareous phosphates. The filtered solution is then precipitated by means of oxalic acid, by which the whole lime is got rid of, and after being filtered, the solution, containing the lactic acid, is evaporated to the consistence of a syrup. It may then be mixed with some alcohol, which precipitates the lactine and some salts, and after filtration the lactic acid is got in a pure state by evaporating the alcohol. It is then digested for six or seven hours, at a sand-bath heat, with iron filings; and, after being brought to the boiling point, is filtered and concentrated, when the lactate of iron falls in crystals on cooling. The alcoholic process may be altogether dispensed with, as, from the feeble solubility of the lactate of iron, this salt may be obtained in pure crystals, leaving the lactine and other salts in the mother liquor.

The crystals ought to be washed in alcohol by the process of displacement, dried rapidly, and excluded carefully from contact with the air. The salt is in the form of crystalline plates of a very white colour. It is of sparing solubility in water, has a distinct ferruginous taste, and its aqueous solution soon becomes super-oxidated, and assumes a yellow colour. It has been usually administered in biscuits or pastilles, the sugar of the last preventing its further oxidation.

On the presence of Iodine in Cod-liver Oil.—By L. Gmelin.—*(Journal de Pharmacie*, April 1840.*)*—The oil prepared from the liver of the cod-fish has of late been extensively employed in practice, both in France and Germany, and the list of diseases in which its use has been found beneficial has been very much extended. The attention of chemists was, therefore, directed to this oil, to ascertain, if possible, the principle upon which its efficacy as a remedy depended. Several years ago, Dr Kopp of Hanau conjectured that it contained iodine; and in 1806, Hopfer de l'Orme ascertained, by chemical examination, that this conjecture was well founded. And, in 1837, M. Haussmann announced that, in one specimen of the oil, he had detected the presence of iodine. His experiments were subsequently repeated by others, but no iodine was detected in the oil subjected to examination. It was, however, afterwards ascertained that the oil in these last instances was adulterated, so that no conclusions could be drawn from them as to the presence or absence of iodine.

M. Gmelin was one of these unsuccessful experimenters; but, on repeating the experiments with pure cod-liver oil, he easily detected the presence of iodine. He operated on 60 drachms of the pure oil, and obtained a saline mass, which, when acted upon by sulphuric or hydrochloric acids, struck a violet colour with a solution of starch, and had all the other usual reactions proper to a solution of iodine. When some of this saline mass was heated in a tube with peroxide of manganese and sulphuric acid, the violet vapour of iodine was at once apparent, and stained paper, which had been dipped in a solution of starch, of a blue colour.

M. Gmelin obtains the saline mass most easily by saponifying the oil with potash, neutralizing with sulphuric acid, filtering, and crystallizing, when the sulphate of potash is got rid of. The residuary liquor is evaporated and calcined. Alcohol removes the salt of iodine from the other saline ingredients, and, on subjecting this to examination, the presence of the iodine is easily detected.

There is then every reason to believe that the cod-liver oil owes its efficacy to the presence of iodine; a fact which is sufficient to explain the high estimation in which it is held by some northern nations, and now, in many parts of Germany.

MEDICAL PATHOLOGY.

Experiments on the Mechanism of Inflammation.—By Dr ROBERT LATOUR.—(*Revue Medicale*, Jan. 1840.)—M. Latour details a number of experiments which seem to demonstrate, that cold-blooded animals are not susceptible of the inflammatory process; and that, consequently, the experiments of Wilson Philip, Thomson, Hastings, Kaltenbrunner, Gendrin, and others, made on these animals, with the view of demonstrating the nature of the inflammatory process, go for nothing. M. Latour has in vain endeavoured to excite inflammatory action in carps and frogs, by applying various irritant substances to the skin, to the abdominal cavity, and to the other tissues of the body; and eighteen experiments are given in detail in proof of his statement. The following is a short abstract of the results.—

Deep incisions were made through the skin and muscular fibre of carps and frogs, and the wounds afterwards stimulated by the application of various acrid agents; as ammonia, concentrated acids, &c. which, though they caused great pain, were not followed by any reaction, either local or general. A peg of wood remained three days in the muscular fibres of a carp; pins were left several days transfixing the limbs of frogs; a piece of wood was left for thirty-six hours in contact with the mesentery of a frog: a piece of a potato was for a much longer time within the abdominal cavity of another; and a seton was kept in the thigh of the same animal for more than a month; the skin of a carp was cauterized with sulphuric acid; a red-hot iron was applied to the thigh of a frog; and yet in not one of these numerous and oft-repeated experiments, could the least appearance of inflammatory action be traced in the irritated wound; there was neither redness, swelling, sanguineous injection, nor suppuration. Nay, more, in those experiments where the muscular fibre of the animal was exposed, the redness which came on immediately after the incision was made disappeared, and the wound filled with a glutinous matter, which served as the basis of the cicatrix. These animals were not, however, insensible to pain, as they showed by their writhings how much they suffered from the operations.

These results being in direct opposition to those arrived at by other experimentalists, M. Latour endeavoured to find out the cause of the difference. As it was chiefly on the frog that former physiologists had experimented, and it was from the phenomena observed in it that they announced they had developed inflammatory action, he repeated their experiments, and succeeded in producing a sanguineous injection, very visible to the naked eye, on the upper and inner surface of the thigh of a frog, by pincing it with a pair of forceps previously dipped in ammonia. He remarked, however, that these parts became covered with a tolerably abundant viscous sanguinolent secretion, and that the animal was seized with convulsions, and expired. M. Latour then discovered that the blood had been coagulated by the action of the ammonia, after having parted with its fluid parts, in precisely the same manner as happens to the blood of the frog when acted on by ammonia out of the body; as soon as the two liquids come in contact they lose their fluidity, and become a homogeneous blackish mass, of a plastic nature, and not easily broken up.

M. Latour inferred from this, that the redness caused by the ammonia was not of an inflammatory nature, but that it was the effect of the decomposition of the blood, which, being deprived of its fluid portions by its affinity for the alkali, was consequently stopped in its circulation by its coagulating within the vessels.

When a frog was plunged in salt water the skin was reddened, and the animal killed. In this case the blood was also decomposed, became more fluid, and the colouring matter was precipitated; and it is to this circumstance that M. Latour attributes the increased redness of the skin. The same peculiar colour was produced by mixing the blood of the frog with a solution of sea-salt.

Similar results followed the application of a red hot iron to the webbed foot of the frog when placed in the focus of a microscope. As the red hot iron was brought nearer and nearer to the web, the blood became coagulated first in the smaller vessels and afterwards in those of a greater volume.

These facts throw doubts on all the conclusions which have been drawn from the observations of experimentalists, on the excited vascular actions of the cold-blooded animals. M. Latour is inclined to the belief, that inflammatory action can only exist in those classes of animals where the temperature of the body is constantly in an exalted condition,—in fact, in the warm-blooded animals alone. Many of his opinions are too fanciful, and rest on too insufficient data to be further noticed.

On the Causes of Scrofulous Diseases. By M. Lugol. (*Comptes Rendus,* 20th January 1840.)—M. Lugol proposed to himself the question whether scrofulous diseases ought to be regarded as the result of accidental external causes, or that of a hereditary predisposition? And the conclusions to which he has arrived are the following,—

The accidental causes do not necessarily produce scrofula, at least it is very doubtful whether they are alone sufficient to produce the disease. The production of scrofulous diseases, however, by hereditary descent, is the most common and the most clearly proved, and which we are enabled to trace in the great majority of instances.

The appearance of scrofula in one child is a sure sign of the whole of the rest of the family inheriting the scrofulous constitution, by virtue of which all the other children have the same original predisposition to the disease. If the families which betray the marks of inheriting a scrofulous constitution are observed with care, it cannot fail to be remarked that they are subject to a great mortality. Scarcely a fourth of the children who are born attain the age of puberty, and it is by no means a rare occurrence to find that families, originally very numerous, have been all cut off even before they reached this period of life. Scrofulous disease, in fact, is one of the most active causes of mortality of the human race; there is no other disease which cuts off so many or so young victims.

In his memoir, M. Lugol endeavours to show that parents who are at present apparently free from scrofulous affections, and yet beget scrofulous children, can, in almost every instance, be traced to have had brothers or sisters who have been affected with scrofulous diseases, or have themselves been the subjects of some scrofulous affection in early childhood He has also been seen instances of scrofula appearing in the parents, after having had born to them scrofulous children. He consequently arrives at the conclusion, that hereditary diseases do not pass over a generation, as has been generally supposed.

Fei Tumours. (*Narrative of a Whaling Voyage round the Globe,* By Fred. D. Bennett, Esq.)—The natives of the island of Raiatea are subject to a peculiar tumour on the shoulders, produced by the pressure of the pole on which they carry their fruit home. Mr Bennett says that procuring their mountain plantains is the greatest labour in which these people engage. They have to travel over an upland and rugged country, bearing on their return burdens of considerable weight. Large, elastic, and insensible swellings are produced on the shoulders of those who are most assiduous in this duty. Such tumours have an unsightly appearance, but appear to be simply modifications of the natural parts, answering the purpose of callosities, and similar structures of necessity, to enable the shoulder the better to bear the pressure to which it is subjected. The natives do not complain of any inconvenience from their presence, but rather regard them with pride, as being tokens of industry.

Prevalence of Elephantiasis amongst the Society Islanders. (*Narrative of a Whaling Voyage round the Globe.*) By FRED. D. BENNETT, Esq.—The following interesting facts with regard to the prevalence of scrofulous affections in connection with a damp low soil, insufficient protection from the weather and poor living, are worthy of being recorded.

Mr Bennett thinks we must either no longer regard the natives of Raiatea as an uncivilized people, or admit that unsophisticated man is as liable to disease as the most refined of his species; for he knows of no one spot, except within the precincts of an hospital, where he has seen so much severe disease, accumulated amongst comparatively few individuals, as upon this small island. A damp and low soil, ill-constructed dwellings, and a diet almost solely vegetable, produce or foster amongst these islanders a scrofulous constitution, which is strongly marked in their maladies.

Bucnemia, or elephantiasis, called by the natives, *fe fe*, though not a fatal, is a troublesome and deforming distemper to which the Society Islanders are particularly subject. Europeans also, resident in these islands, are equally liable to its attacks; but it has never been observed in any individual under the age of puberty. The extremities, which are the parts of the person chiefly affected by the disease, assume under its influence a rugged and hardened texture, and a colossal, shapeless appearance, not inaptly compared to the limb of the quadruped, whence one name for this disease is derived.

It is a malady which has a wide range of chiefly intertropical country. Its causes are obscure, and those commonly assigned are vague and insufficient. Mr Bennett thinks that the diet and general habits of a nation must be set apart from the question: for it is observed, that people, according in these respects, do not alike participate in the disease; whilst others, differing essentially on such points, are all equally liable to bucnemic attacks. Peculiarities of soil offer a fairer field for inquiry. Many facts tend to prove that elephantiasis chiefly obtains on lands too abundantly watered, (on all such soils, indeed, as are best adapted for the cultivation of rice), and where the inhabitants reside in the low, jungly, and moist districts. Mr Bennett states, that, at Pitcairn's Island, which is destitute of fresh water, almost to an inconvenient degree, this disease is unknown. At St Christina Marquesa Islands, where rivers are few and well confined to their channels, and the soil generally dry and strong, he did not observe a single instance of *fe fe* amongst the natives, although in food and habits they differed in no material manner from the Society Islanders. The Sandwich group, which offers a third Polynesian nation exempt from this complaint, has on many of its islands large streams, and plenty of taro patches; but the effects of moisture are not evident beyond the banks of the rivers or the roots of the taro; while the general face of the land, and the principal residence of the people, is a sandy and arid soil, often sterile from a defective supply of water.

The only fact he noticed that militated against this mode of accounting for the origin of elephantiasis, was at the small island of Maurua of the Society group. On that spot, although water is as scarce as at Pitcairn's Island, Mr Bennett witnessed several cases of *fe fe* amongst the inhabitants. So constant, however, is the interchange of population between Maurua and other islands of the group, that it was difficult to ascertain whether the people thus afflicted were natives of the island, and much more, if they had only resided on this soil.

Mr Bennett mentions that pulmonary consumption occurs amongst these islanders; and that scrofulous affections of the joints, and of the mesenteric and other glands, are of frequent occurrence. Large wens on the head and neck, and indolent abscesses from phlegmonous erysipelas, were common. Angular distortion of the spine, the consequence of scrofulous disease, was frequently noticed. Strumous and purulent ophthalmia and other affections of the eye were by no means rare.

MEDICAL THERAPEUTICS.

Lactate of Iron in Chlorosis.—(Archives Generales de Medecine, March 1840.*)*—The pastilles of the lactate of iron have been of late strongly recommended in the treatment of chlorosis. MM. Bouillaud and Fouquier have made numerous trials of it in this disease, and it appears to have surpassed their most sanguine expectations. They describe it as causing increase of the appetite the first days of its employment, soon followed by cessation of the symptoms of chlorosis: and a cure has generally been effected in from fifteen to twenty days.

On the employment of Cimicifuga in Chorea. By Dr Kirkbride. *(American Journal of the Medical Sciences,* Feb. 1840.)—The *Cimicifuga racemosa* of Nuttall, or black snake-root, was several years ago brought under the notice of the profession by Dr Young of Pennsylvania, as a valuable remedy in chorea; and Dr Kirkbride has given seven additional cases, which go far to prove the efficacy of the remedy as a cure for that disease. He usually employed free purging for a few days before beginning the administration of the snake-root, which was given either in substance or in decoction. No other medicine was required during the period of its administration, and the cures were in general complete within four weeks after its use was commenced.

Dr Kirkbride was unable to ascertain in what manner this root produces its physiological effects, as in the largest dose in which it had been exhibited, it had no very evident action on any organ of the body. The bowels were in general moderately open during the use of the remedy, but nothing like purgation was ever produced.

Apparatus for promoting Respiration in Cases of Suspended Animation. Communicated by Dr Lewins of Leith, in a Letter to the Editor.—Dear Sir,—I regret that the urgency of my engagements has prevented me from sending you the report I promised, of the trial I lately made of an apparatus invented by Dr Dalziel of Drumlanrig, for promoting respiration in cases of suspended animation, &c. &c. As a piece of intelligence, however, fraught with importance to humanity and the medical profession, I beg you will give it a place in the forthcoming number of the Edinburgh Medical and Surgical Journal.

In the case of a seaman lately brought to the Humane Society's rooms here, I found Dr Dalziel's apparatus to answer the purpose completely, so far as respiration was concerned. The dead body was made to breathe in such a manner as to lead the bystanders to suppose that the unfortunate individual was restored to life.

In consequence of the patient's body being enclosed in the interior of the apparatus, the elevation and depression of the chest were not perceptible, but the effects of the air entering into and returning from the lungs were very visible on the cheeks, the lips, and also of the nose. A lighted candle was extinguished by being held under one nostril, and again lighted by being placed opposite to the other.

I shall prepare a statement of the case referred to, and with Dr Dalziel's leave, have a drawing made of the apparatus, which, with such remarks as the subject suggests, I shall transmit for insertion in the next number of your Journal.

The principle on which Dr Dalziel's apparatus acts is, that the body, with the exception of the head, be in vacuo, or nearly so. This is easily done by putting the body to be operated upon, in a box that can be made air-tight. On the top, a large syringe is placed which communicates with the interior.

By elevating the piston of the syringe, a partial void is created, to fill up which, the air of the atmosphere rushes into the lungs through the trachea, and distends the chest. Expiration is accomplished by depressing the piston.

I have nothing further to add at present, but the reiteration of the opinion expressed above, viz. that this invention is one fraught with importance to humanity and medical science.—I am, &c.

LEITH, *June* 18, 1840.

SURGICAL PATHOLOGY AND THERAPEUTICS.

New facts with regard to Strangulated Hernia. By M. LAUGIER. (*Comptes Rendus*, 2d March 1840.)—Every one knows that in strangulated hernia, the upper extremity of the intestine, or that part which is comprized between the stomach and the seat of strangulation, becomes distended by fluid, gaseous, or fecal matters, whilst the lower portion remains flaccid, or, at least, the matters found in it do not distend it more than usual.

No attempt has yet been made to draw practical inferences from this fact, so as to use it as a means of distinguishing intestinal from omental hernia; or which portion of the intestinal tube, whether the large or small intestine, was contained in the hernial sac. This has, however, been done by M. Laugier, who considers it both as a simple and sure means of diagnosis, besides possessing the additional advantage of indicating the relative urgency of the case for operation. The results of his observation are embodied in the following conclusions.

1. The extent, the form, and seat of the meteorism of the belly, during strangulated hernia, vary according as the hernia consists of omentum or intestine, and according as the upper extremity consists of the small or the large intestine. Its extent varies also according as the portion of small intestine included in the hernia is more or less distant from the stomach.

2. In omental hernia, before the developement of peritonitis, the belly is soft, and flat even in the neighbourhood of the hernia. There is no meteorismus, (windy swelling).

3. Meteorismus appears very rapidly when the hernia consists of intestine.

4. When the hernial sac contains the large intestine, the sigmoid flexure of the colon for example, the upper extremity consisting of nearly the whole of the intestinal tube, the meteorismus is general, and gives to the abdomen an almost cylindrical form.

5. If the small intestine is alone in the hernial sac, or along with a portion of omentum, the flakes and the epigastric region are soft and depressed; the swelling of the abdomen occupies the hypogastric and umbilical regions. The swelling is spherical, or nearly so, resembling in this respect some encysted tumours, or the uterus at the sixth or seventh month of pregnancy, from which, however, it differs in many essential characters.

6. When the strangulated part of the intestine is near the stomach, the swelling of the abdomen is trivial, in proportion to the duration of the strangulation; for in that case the upper extremity of the tube is only of small extent.

7. From these facts may be deduced the unexpected and important conclusion, that in crural hernia, and in some inguinal hernias, where gangrene is most to be feared, all haste should be used either to reduce it by the taxis or by operation; for if by the occurrence of gangrene of the intestine an artificial anus should be formed, its proximity to the stomach renders it more dangerous for the patient. A swelling of small extent, li-

mited to the neighbourhood of the hernia generally, inspires a security which may lead to fatal results; whilst it is the general meteorismus, or one, at least, which is very extensive, that alone permits of delay, since it indicates the incarceration of a portion of intestine which is far from the stomach.

8. It is only before the accession of general peritonitis that the characters of the windy swelling, above indicated, can be relied on; they are most marked at that stage.

M. Laugier adds, that these remarks have been all verified by careful clinical observation, and by the result of many operations for hernia.

On the use of Tobacco in the reduction of Strangulated Hernia. By Dr Jackson of Philadelphia. (*American Journal of the Medical Sciences,* Feb. 1840.)—Dr Jackson says he has long preferred the employment of tobacco in cases of hernia or dislocations, to the copious detractions of blood, which were both formerly, and are still too much in use. To lose a sufficient quantity of blood to induce fainting, and preserve the system in this state till a bone or hernia may be reduced, is an expenditure of the vital fluid, and a waste of strength, which very many will take months to recover. This is particularly the case in old people, in whom hernia is most common, and in whom it is more necessary to husband the powers of life. Dr Jackson has tried ice, cupping, bleeding generally, warm baths and hot fomentations, but has been induced successively to abandon them, as "tobacco will do all that bleeding can do, however great the inflammation, all that ice, or cupping, or belladonna, or any other means can do, that have ever been invented."

In cases where he has not had it in his power to administer tobacco in enemata, he has derived equal advantage from causing the patient to swallow tobacco smoke, the same sickness and extreme relaxation of the frame are induced as when tobacco is administered in glysters, and he thinks that this mode of using it might in many cases be preferable, especially in women, where " delicacy ought always to be carefully regarded.

Dr Jackson mentions that, in his extensive practice, such has been his success in reducing hernia by the aid of tobacco in glysters or in smoke, that he has only had occasion to operate three times, and these were in the practice of other practitioners. He does not consider it a dangerous remedy in the hands of a scientific or careful physician, as they will consider the idiosyncrasies and strength of their patients, and use the remedy with prudence.

Several interesting cases, illustrative of his mode of using the tobacco, are given. They seem cases which in this country would have been subjected to operation; and prove what a powerful remedy we possess in tobacco, both for the production of complete depression or exhaustion of the vital powers, and the allaying of inflammation.

Scrotal Tumour containing the debris of a Fœtus. By N. Victor Izokalski. (*Archives Generales de Medecine,* March 1840.)—A man, of about 21 years of age, was admitted into the Hospital of La Charité on account of a scrotal tumour of the size of a large egg. He said that it had existed from birth; and his mother stated, that, at the age of four months, it was as large as it is at present. It has always been insensible, so that he could prick it with a needle without causing any pain whatever. At the posterior part of the tumour, three small apertures existed, from which there has always escaped a little fatty matter; and a tuft of hair projected from one of these apertures, which, according to the narration of the patient, existed long before hair was developed on the pubis.

The skin which covered the tumour was very white, and covered with a quantity of fine short hairs, quite different from those on the scrotum.

The tumour had a fibrous consistence; it, however, was softer on some points, and posteriorly it felt as if a bony concretion was surrounded by soft parts.

The testicle and epididymis were placed on the inner or median side of the tumour, and appeared to be perfectly sound. The cord appeared to be uninjured.

M. Velpeau, who gave it as his opinion, that the tumour consisted of the debris of a fœtus, excised it, and dissection proved the justness of the diagnosis.

The tumour was laid open by a transverse incision, when it was found to be composed of several cysts of different sizes, and containing different matters. The largest was filled with a fatty matter, of a grayish colour, composed of small isolated masses bound together by a gelatinous matter. Another cyst of the size of a walnut was filled with a fatty matter similar to the preceding, but of a deeper colour; and amongst this substance was found a quantity of very fine hairs. Other small cysts were filled with yellowish coloured matters of the consistence of the vitreous humour. The compact part of the tumour presented none of the characters of any of the known structures, whether natural or diseased. Though of a fibrinous consistence, it was still somewhat soft, and was of a rosy hue. In it were found masses of fat, which were easily recognized; but the most remarkable substances were found in its centre; these consisted of bones articulated to one another. By a very minute dissection, these were separated into three groups. The largest appeared at first formed of a single piece, but when the soft parts were carefully removed, it was found to be composed of a pretty strong but irregular bony column, to one of the sides of which was attached a projection which bent upon itself in two different directions; and from its opposite side two osseous fragments articulated together, the whole being united to the osseous column above mentioned. Although these bones were disposed in an irregular manner, there was every reason to believe that they were the bones of the pelvis. The other group was composed of long bones articulated by means of a fibrinous medium. There was attached to this group one flat bone. The third group was composed of several flat bones, and of a number of small bony masses united together; probably the debris of the head and spinal column.

Foreign body in the Larynx.—(Séances de l'Academie Royale de Medecine, 28th Jan. 1840.*)*—A young child, while playing with common beans, allowed one to escape into the larynx. The usual symptoms of suffocation were immediately induced, but were calmed, as by enchantment, by the administration of a table spoonful of olive oil. Whenever the symptoms of suffocation recommenced, they were found to be relieved by the administration of the oil; the operation of tracheotomy was therefore not performed, and on the fortieth day after the escape of the bean into the larynx, it was coughed up in fragments.

M. Renauldin mentioned a curious fact with regard to the presence of a foreign body in the air-passages. On opening a body, a fragment of a nail was found in the lung; and yet no symptom existed during life, which could have led to the supposition that a fragment of iron was contained in these organs.

Foreign body in the Knee-Joint caused by a detached fragment of one of the Condyles of the Femur.—By Dr Malherbe.—*(Journal de la Loire-Inferieure,* Jan. 1840.*)*—A man of about 35 years of age, when leaping across a ditch, felt an acute and sudden pain in the right knee, and fell to the ground. He immediately, however, arose, and then became aware of the presence of some foreign body between the articular surfaces, which prevented him stretching the leg upon the thigh. The foreign body was displaced by an effort which the person made, and he was then able to walk without particular inconvenience. From this period he frequently experienced the sensation of a foreign body introducing itself between the articular surfaces, which was always followed by extreme pain, but never by active inflammatory symptoms; only he was obliged to keep his bed for a few days till some motion of the limb displaced the foreign body, and placed it in some part where it no longer interfered with the movements of the joint. The knee gradually became swollen, and the patient could feel the foreign body sometimes at the external, and sometimes at the internal part of the knee.

Two years afterwards he sought relief from this affection, and the foreign body being felt on the outer part of the knee-joint, was fixed there, and a small incision being made over it, it was extracted without difficulty,—a considerable quantity of synovial fluid escaping at the same time. The foreign body was of the form and about the size of an almond, smooth and cartilaginous on one surface, rough and osseous on the other.

Violent inflammation of the knee-joint came on two days after the operation; gangrene attacked the foot and spread rapidly up the leg; and the patient died six days after the performance of the operation.

The joint was found filled with purulent matter, and the synovial membrane was of a reddish-brown colour. The external condyle of the femur presented on its middle surface a loss of substance, of the exact dimensions of the foreign body extracted from the joint.

New operation for the cure of Strabismus. By M. DIEFFENBACH. (*Comptes Rendus*, 3d February 1840.)—M. Dieffenbach has thrice performed an operation for the cure of strabismus, which has been followed with most complete success. The individuals operated on have been presented to the Medical Society of Berlin, and also to M. Jungken, the celebrated oculist, both of whom have expressed themselves as highly gratified by the success of the operation.

The first patient operated on was a child of 7 years of age, who squinted very much inwards with the right eye. The operation was performed in the following manner. The eyelids were held separated by means of blunt hooks; a small finely-pointed hook was then fixed in the conjunctiva of the internal angle of the eye, and was held there by an assistant. The ball of the eye was then drawn outwards, and the conjunctiva at the internal angle of the eye was carefully cut through, and the incisions were cautiously repeated, till the internal rectus muscle was arrived at, which was then cut through with a pair of fine pointed scissors. The eye, now acted on by the external rectus, was suddenly drawn outwards, but soon became fixed in a natural situation, looking straight forwards. The hæmorrhage was not great; and the inflammation which followed the operation was limited to the internal angle of the eye. The treatment consisted solely in applying cold compresses, and the patient was perfectly cured in eight days.

The second case was in a child of 10 years of age, who was affected with a convergent squint of the right eye. The operation was performed in the same manner as in the first case. The conjunctiva was incised, the globe of the eye drawn outwards, and the internal rectus muscle cut through. No sudden movement of the globe outwards was observed in this case; the eye fixing itself in the straight position at once. The cure was completed at the end of a week by the same treatment as in the former case.

The third patient was a boy of 15 years of age, who had a convergent squint of the left eye, and was operated on at La Charité, in the same manner as the preceding case. When the internal rectus muscle of the eye was cut, the globe was suddenly drawn outwards, but immediately afterwards took a straight position. Eight days after the operation, the cure was complete, and not a trace of the squinting could be noticed.

The same operation has been performed by Mr Mayo, Mr Guthrie, Dr Franz, and various surgeons in London; and in this place by Mr Syme.

New method of treating Retroversion of the Uterus. By CHARLES HALPIN, Esq. (*Dublin Journal of Medical Science*, March 1840.)—Mr Halpin was called to attend a case of retroversion of the uterus, in a woman of about 23 years of age, and between the fourth and fifth month of her pregnancy. The abdomen was greatly distended from an accumulation of urine in the bladder, and for the last two days before being seen she had not passed more than two ounces of urine. On examining by the vagina the uterus was discovered to be completely retroverted, the fundus lying low in the pelvis, within an inch of the external parts. After several vain attempts to introduce a catheter, Mr Halpin at length succeeded, and drew off, by means of a flexible male catheter, several pounds of urine. The urine was drawn off in this manner for several days, and various attempts were made to restore the uterus to its normal position, but in vain; and as the symptoms were every day becoming more aggravated, it was quite apparent that some plan, besides those usually recommended in retroverted uterus, must be had recourse to in order to give relief.

In attempting to replace the uterus, Mr Halpin found that he could always move it to a certain extent, but that after it reached this, it became fixed, and he could feel the parietes of the uterus yielding under the point of contact of the fingers. He therefore inferred that the only chance of rescuing the patient from her perilous state would be in the use of some instrument which could be brought to bear equally on all parts of the tumour, and with which sufficient power could be applied to raise it fairly above the promontory of the sacrum.

It occurred to him, that, with the assistance of a bladder, he would be able to inflate the pelvis, and thus raise its contents into the abdomen; and he immediately acted on this suggestion. He attached a small recent bladder to the tube of a stomach-pump, with an air-tight piston, and having immersed it for a few moments in warm water to bring it to the temperature of the patient's body, he introduced it empty into the vagina, between the fundus of the uterus and the rectum. It was retained in this position, by the hand being pressed firmly over the orifice of the vagina and cautiously inflated. After a time, the patient complained of a sensation of tension or bursting, but not of pain. He then ceased throwing more air into the bladder for about five minutes, allowing what was in already to keep up a steady, well-directed pressure on the tumour. At the expiration of the five minutes, more air was thrown into the bladder, when the patient exclaimed that he was forcing something up to her stomach. The bladder was retained for some little time, and then a small portion of air was allowed to escape from it, so as to permit of the introduction of a finger, when he had the satisfaction to find that the tumour was no longer to be felt in the pelvis, and that the *os uteri* lay within reach of the finger, and pointed downwards and backwards. Upon this the apparatus was withdrawn.

The simplicity and safety of this apparatus recommends it strongly to the obstetrical practitioner, and it assuredly appears better fitted for accomplishing the end in view, viz. the restoration of the uterus to its natural position, than any of the other painful methods which have been proposed. Mr Halpin suggests that, if the introduction of air should not be found to give a sufficient dilating force, water could be easily employed, which, at the same time that it puts us in possession of an irresistible power, is so completely under control that no bad consequences can result.

Mr Halpin recommends the same instrument to be used as a pessary for the retaining of the uterus in its position after its replacement. Being filled with air it will occasion less annoyance to the urinary passages, and cannot, from its nature, obstruct the free passage of the urine or feces.

OBSTETRICS.

Puncture of the Bladder a safe operation. (*Seances de l'Academie Royale de Medecine*, 14th Jan. 1840.)—M. Levrat of Lyons was lately called to a child labouring under retention of urine, caused by a urinary calculus lodging in the urethral canal. To relieve the present urgent symptoms, he punctured the bladder, and afterwards broke down the calculus in the urethra, and extracted it; the child rapidly recovered. M. Levrat has frequently punctured the bladder, and in every case the operation was followed by the happiest results.

M. Gerdy regards puncture of the bladder as a very safe operation. He has performed the operation in various cases and circumstances, and always successfully. One of his most interesting cases was one where the perineum was much bruised in consequence of a fall on that part: retention of urine was the consequence; puncture of the bladder was performed, and the patient rapidly recovered.

Case of extirpation of the Uterus.—By M. LUYTGAERENS of Zèle.—(*Annales de la Société de Medecine de Gand*, Dec. 1839.)—Josephine Vans Mousselde, of a good constitution, and about 36 years of age, was, after a laborious labour, delivered of her first child in the year 1835. She enjoyed good health till about the end of the year 1837, when she began to suffer from uterine discharges, consisting of blood, or blood mixed with purulent matter, accompanied by pains and a dragging sensation caused by a tumour in the vagina.

In the month of August 1838, she applied to a physician, who recognized the presence of a large fleshy polypus attached to the fundus of the uterus, and which, by its weight, had caused a complete prolapsus of that organ. The tumour projected externally, more or less, according to the position in which the patient was placed. It was about the size of the fist; largest below, and contracted above where it adhered to the uterus. At its upper end a hard circular ring was felt, apparently the *os uteri*, between which and the tumour the finger could not be pushed. From this circumstance it was believed that the uterus itself was reversed, and constituted the upper portion of the tumour. All the parts were covered with an abundant sanies, exhaling a fetid gangrenous odour; hectic fever had already come on, and the patient was evidently sinking under the disease. Extirpation of the tumour was therefore resolved on as the only means of saving the life ot the patient, and the operation was performed in the following manner.

The patient was laid on her back on the edge of the bed, the thighs well separated, and the tumour seized with the double forceps of Museux; the whole mass was then drawn beyond the external organs of generation, and, being held fixed in this position, was extirpated by means of a strong pair of curved scissors. Scarcely was the first cut made, when a cavity was opened into; a circumstance which showed that the uterus was included in the section. A finger was introduced into the cavity by the incision, and directed upwards, but it was found that adhesions had taken place, which prevented its reaching the common peritoneal cavity. The operation was then finished, ligatures being applied to each artery as it was cut through.

The operation was not followed by hemorrhage nor any other unfavourable event. The pain was easily allayed by opiate and emollient injections, and by opiates administered internally, and in ten days the cure was complete.

The third month after the operation the menstrual flux reappeared but in very small quantity; and six months after the operation she was in the enjoyment of good health; her menstruation was regular, but in very small quantity; and she was able to follow her ordinary occupations.

TOXICOLOGY.

Case of Poisoning by Colchicum Seeds. By Dr **Neubrandt.** (*Medicinisches Correspondenz-blatt*, 1840.)—A man, 52 years of age, took by mistake, on the evening of the 18th February, a decoction of the seeds of colchicum, made with a table spoonful of the seeds to a pound and a-half of water. During the night he vomited, and passed more than fifteen stools. He was seen by Dr Neubrandt next morning, but was not then complaining much. The vomiting and purging were less frequent, and though he felt weak, he had no pain, and could sit up. The abdomen, though not distended, contracted spasmodically when touched; the pulse was small and rather quick; the stools had a very fetid odour, and contained a quantity of whitish looking membranes. He was first ordered tepid water and melted butter, but this excited the vomiting and purging of new. Strong infusion of coffee, and also infusion of marsh mallows with lemon juice were next prescribed.

Next morning, the 20th, he presented the following symptoms; his face was pale, the eyes sunk in the orbits, and the pupils very much dilated, the respiration was hurried, and he groaned much. The tongue was covered with a whitish fur, and was with great difficulty protruded. The region of the stomach was painful. His breath, face, and extremities, were cold; the pulse very quick, and scarcely to be felt. The purging was more constant, and the stools contained matters of a clear blue colour in considerable quantity. Although he gave distinct answers to questions which were put to him, his intellectual faculties seemed to be confused. He died at ten o'clock. The only symptoms of any portion of the poison having been absorbed were the continuance of the vomiting and purging.

The body was examined twenty-three hours after death. The pupils of the eyes were very much dilated, the eyes were much sunk, and the mouth spasmodically closed. There was remarkable rigidity of all the members and muscles. The abdomen, scarcely more swollen than during life, was of extraordinary rigidity, and was covered with peculiar looking spots, which were especially numerous in the region of the stomach, and on the sides of the abdomen; these spots were of a violet and greenish blue colour, presented the appearance of rays, and were not circumscribed. The muscles were of a deep blue colour, as if they had been dried in the air. The trachea was inflamed at its bifurcation. The lungs were collapsed, pale, and soft to the touch, but not diseased. The heart was turgid with coagulated blood, and covered with spots of a black, violet, and brown colour. The œsophagus was of a natural appearance till towards the cardia. The stomach was of a light violet colour, its cardiac orifice being of a deep violet. The veins of both stomach and intestines were much distended by very dark blood. The liver had a violet hue over its concave surface; and the gall-bladder was much distended with green bile. A few red and brown mottlings were observed on the surface of the intestines, but otherwise they presented nothing unnatural. The other organs of the body appeared to be healthy.

Seven Cases of Poisoning by Arsenic successfully treated by the Hydrated Peroxide of Iron.—By Dr **Puchelt**, Junr.—(*Medicinische Annalen*, Jan. 1840.)—The seven following cases seem to confirm all that has been stated with regard to the hydrated peroxide of iron being the safest, the surest, and the most easily administered of all the antidotes yet discovered for poisoning by arsenic.

Charlotte Leuz, 33 years of age, was taken suddenly ill shortly after dinner. M. Puchelt found her exhibiting all the symptoms usually attending a case of poisoning. There was violent vomiting, accompanied by acute spasms in the region of the stomach, pale face, prostration of strength, small very feeble pulse, &c. She said she had dined at the house of a mason of the name of Bauer, with three young children, and that, about a quarter of an hour after dinner, she had felt herself so ill that she was obliged to leave the house.

M. Puchelt immediately ran to Bauer's house, and found the three children lying on the floor, with sunk features and expression of great suffering. Their respective ages were fifteen months, three years and a-half, and five years and a-half. The youngest, which was yet at the breast, had taken but a few spoonfuls of the poisoned soup, and was not so violently affected as the rest. The others had partaken largely of it, and had vomited several times. The father, who had swallowed about two platesful, had returned to his work, but was soon forced to leave it, on account of acute abdominal pains. Severe vomiting soon came on, attended with spasmodic pain in the region of the stomach, with pale sunk countenance, feeble pulse, and great depression.

M. Puchelt learned that the woman Leuz had put by mistake into the soup a spoonful of rat-poison instead of flour. The rat-poison was prepared with flour, sugar, and arsenic, and had been left carelessly lying in the press. A large spoonful of the hydrated peroxide of iron was immediately administered to Bauer, and a smaller quantity to the children. He administered a similar dose to the woman Leuz.

Five minutes after the administration of the first dose Bauer vomited, when a second dose was given, soon after which he became more calm. The three children also ejected by vomiting the first dose, but the two youngest fell asleep a short time after the administration of the second. A third dose was given to Bauer after the lapse of a quarter of an hour, soon after which he passed a greenish-yellow stool. The spasmodic pains, and general uneasiness abated after this very considerably, and his colour became more natural.

The woman Leuz also vomited the first dose, but retained the second; shortly afterwards she had also a third dose, and, as she still complained a good deal in the evening, a fourth dose was administered. The eldest of the children, who had taken least of the antidote, was also complaining of uneasiness and pain, and was forced to take another dose of the hydrated peroxide of iron.

Next day Bauer was able to return to his work. His two youngest children were also well; but the eldest child, as well as the woman Leuz, still complained of uneasiness and occasional pains in the abdomen, and suffered much from palpitations of the heart. In the evening a purgative was given to both, and in a few days they were restored to health.

Chemical analysis showed the presence of arsenic in the rat-poison, some of which still remained. Arsenic was also detected in the soup, as well as in the matters vomited. The matters which were rejected after the administration of the hydrated peroxide of iron were also carefully examined, and the arsenic was found to have united with the iron, and to have formed the arseniate of iron.

In another instance two children of 8 and 12 years of age, added by mistake a half spoonful of rat-poison to some sour kraut, which they recognized to be arsenic, but to late too prevent themselves suffering from its effects. They were shortly seized with all the symptoms of poisoning. Six hours after partaking of the poisoned food, the hydrated peroxide of iron was administered, and was soon followed by a complete cure.

STATISTICS.

On the Influence of the Manufactures on the developement of Children. By M. Dupin. (*Comptes Rendus*, 13th April 1840.)—The pernicious effects which result from confining children in manufactories, both as influencing their health and growth, have been pointed out by M. Dupin in his interesting work on this subject. One fact alone may be stated here, to show the value of statistical researches in eludicating the subject.

M. Dupin chose ten agricultural districts and ten manufacturing districts, and in these ascertained with great care the number of men of 20 years of age who were rejected as recruits on account of deformity or general unfitness for military service. In the agricultural districts, in order to furnish a complement of 10,000 recruits fit for military service, it was found that 4029 were rejected as infirm or deformed; whilst in the manufacturing districts, to furnish the same number of men, it was necessary to reject 9930 as infirm or deformed.

In some of the departments, however, the number of men infirm or deformed was much greater. Thus to obtain 10,000 men capable of carrying arms in the department of the Marne, 10,309 were rejected as infirm or deformed; in that of the Lower Seine, 11,990; and in that of the Eure, 14,461.

In the towns of the department of the Lower Seine, the numbers rejected rose much higher. Thus, to obtain 100 men sufficiently strong to carry arms, it was necessary to reject, on account of weakness or deformity, at Rouen, 170 young men of 20 years; at Elbeuf, 200; and at Bolbec, 500.

Statistics of the United States Army for 1839. By Thomas Lawson, M. D. (*American Journal of the Medical Sciences*, February 1840.)— The whole number of cases under treatment during the year 1839, was 22,849; of this number, 22,248 were new cases, and 649 remained from the preceding year. Of the whole number of persons reported sick, 21,940 returned to duty, 131 were discharged the service, 55 deserted, and 214 died, leaving 909 still on the sick list.

The following table shows the prevalent diseases and their respective mortality.

Diseases.	No. of cases.	No. of deaths.	Diseases.	No. of cases.	No. of deaths.
Intermittent fevers,	3761	6	Syphilis, .	269	1
Remittent fevers,	756	45	Epilepsy, . .	53	4
Synochal fevers, .	97	0	Apoplexy, . .	5	3
Typhus fever, .	13	6	Delirium tremens, .	43	6
Catarrh, . .	1908	0	Gastritis, . .	79	3
Cynanche, .	266	0	Enteritis, . .	36	4
Cholera, . .	206	0	Diarrhœa, . .	1462	26
Colic, . .	340	0	Dysentery, . .	1188	20
Acute bronchitis,	107	0	Nyctalopia, .	53	0
Pneumonia, . .	104	7	Dropsy, . .	28	7
Pleurisy, . .	171	1	Scorbutus, . .	111	6
Phthisis, . .	70	22	Ebriety, . .	354	7
Hepatitis, .	52	0	Hernia, .	33	0
Rheumatism, .	1029	1	Wounds and injuries,	2377	13
Ophthalmia, .	329	0	Ulcers and abscesses,	1077	3
Gonorrhœa, . .	374	0	All other diseases,	3683	23

From the monthly returns and other reports, it was estimated that the aggregate mean strength of the army for the last year was 8950; and as the number taken sick during the year was 22,248, and the aggregate of deaths was 214, it will appear that the proportion of cases of disease to the number of men in the service, was as 2½ to 1, or 249 per cent.: the ratio of deaths to the number of men as 1 to 42, or 2$\frac{4}{10}$ per cent.; and the proportion of deaths to the number of cases treated as 1 to 107, or a fraction less than 1 per cent.

Revaccinations at Villingen in 1838. (*Gazette Medicale de Paris,* April 1840.) One hundred and twenty-three persons have been revaccinated, and it appeared, that, from the age of 11 to that of 20, the individuals vaccinated are susceptible of receiving the vaccine virus nearly in the proportion of two-fifths. This susceptibility was found to augment from the age of 21 to 30. It was, besides, remarked, that persons under 20 years who had been vaccinated and were seized with the epidemic small-pox, had the disease much milder than if they were older, and that the severity of the attack was nearly in proportion to the distance of the time when they had been vaccinated. Aged persons are therefore liable to be affected as violently by the disorder as if they had not been vaccinated. It was noticed that, during the epidemic small-pox which raged at Villingen, during the years 1837–38, not a single individual who had been revaccinated was seized with either small-pox or cow-pox, although several of these were revaccinated in the houses where small-pox patients were lying. The operation was never followed by any disagreeable results.

Report of the Provisional Committee of the North of England Medical Association, on the Present State of the Medical Profession.—" The Committee, in the performance of the task confided to them, deem it unnecessary to expend many words in an attempt to prove, that the state of the Medical Profession, throughout Great Britain and Ireland, has long been most unsatisfactory. This appears to be universally admitted; and in the minds of those who have reflected on the subject, no doubt seems to prevail that some new legislative enactments are imperatively demanded, to prevent a continuance of the pernicious consequences which have resulted, in some instances from inadequacy, and in others from the imperfect administration, of the laws relating to the profession. Questions connected with the public health have not hitherto received, in this country, a degree of attention commensurate with their importance; although such questions have for centuries been recognised as objects of legislative care. From early periods of English history, and during the reigns of various sovereigns, statutes have been passed with a view to prevent the public from being imposed upon by ignorant pretenders to medical and surgical knowledge. Nevertheless, in no civilized nation of Europe is so little impediment offered to men who, without proper qualification, are permitted to exercise the functions, and usurp the privileges, of the duly authorized medical practitioner. The number of those individuals who have entered into practice without submitting themselves to any examination as to their attainments, is great, and is continually increasing. Chemists and druggists are in the constant habit of prescribing for diseases with whose nature it is impossible they can be acquainted; imposture of every kind is practised with impunity; and empiricisms, in its most aggravated forms, has reached an unheard of extent, in a country abounding with colleges and medical institutions, and where degrees, diplomas, and licenses to practise, are derived from no fewer than nineteen different sources.

" It may appear strange, that abuses, such as are found in the administration of medical affairs, should have been permitted to exist for so long a period of time. They have, however, within the last few years, begun to attract the *serious* attention of medical practitioners. Vigorous and combined efforts are now making in different parts of the empire to counteract their pernicious tendency; and the Committee cannot but congratulate the Association on the prospect thereby afforded, of some remedy being, ere long, applied to the many evils which, under present circumstances, have occasioned cause for complaint and dissatisfaction. The benefit likely to arise to the profession from such unions of its members is incalculable. They serve to point out and expose the defects and abuses of existing systems, and to pronounce, emphatically, the common feeling of the profession as to the necessity of their removal. They afford opportunity for accumulating information, and for discussing a variety of topics relating to the interests of the profession—and thus prepare the way for a definite understanding and agreement as to the measures best calculated to insure an efficient and comprehensive scheme of Medical Government. The Committee entertain a lively hope, that efforts such as have already been made by different Societies and Associations, if steadily pursued, will ultimately lead to important and salutary changes.

"Having endeavoured to show, that, consistently with the spirit of the laws of this realm, it is a duty incumbent on the state to adopt measures for protecting the health, as well as the lives and property of its subjects, the next inquiry must be as to the extent to which this end has been promoted by those institutions which have from time to time been placed at the head of medical affairs.

"The Corporate Bodies now presiding over the profession are totally unable either to guard the public from imposture, or to secure the *duly authorised* medical practitioner against an unfair and unjust competition with persons who undertake the treatment of the various diseases to which the human frame is liable, without being able to adduce satisfactory evidence of having made suitable preparation for the difficulties and responsibility of medical practice.

"The constitution of most of the Medical Corporations is liable to the strongest objections, and is such as to have rendered them generally unpopular throughout the profession. Their charters are for the most part characterised by a tendency to take away power from the community, and to make the governing bodies wholly independent of those whose interests they are in duty bound to cherish and protect. They are under the direction of self-elected and irresponsible officers, who, in some instances, retain their places during life, and have entire disposal of the funds arising from the contribution of the members, between whom and themselves there is little community of interest or feelings. Partial Reform, it must be granted, have taken place, from time to time, in some of the Corporations—more especially since the investigation which was instituted by Parliament in the year 1834; but they have by no means reconciled members of the profession to the continuance of a system of whereby they are, as a body, almost entirely deprived of any share in the management of those institutions.

"A statement was made to Lord John Russell, when Home Secretary, by the Council of the British Medical Association, to the effect, that out of 1830 practitioners employed under the Poor Law Amendment Act, 327 had not been examined in Surgery, 323 had not been examined in Medicine, and 233 had not been examined *at all!* In a memorial lately presented to the Secretary of State, by the Medical Association of Ireland, it is affirmed that 'some of the Dispensaries of Ireland, which are supported at very considerable expense to the country, are entrusted to persons who have received little or no medical education.' The same document contains the following passage:—'The services of Medicine are required in both the civil and criminal judicature; but, singular and barbarous as it may appear, it is no less true, that neither the written statutes, nor the opinions of the judges, define who are to be recognized as the administrators of those services; and while the letter of the law is apparently complied with, by the reception of the evidence of any man who chooses to assume the medical character, its spirit is frequently evaded by the attribution of that character to persons altogether destitute of any right, nominal or legal, to its possession. Coroners and other magistrates can, and do, commit accused persons to gaol, solely on the testimony of witnesses whom those officers may choose to consider medical; juries pronounce capital convictions, and decide questions of inheritance, upon similar grounds; and inoffensive members of society are torn from their homes, and incarcerated in lunatic asylums, upon the certificate of any one who chooses to call himself a member of the Medical Profession.'

"The Committee have pleasure in acknowledging the greater liberality evinced of late by the London College of Physicians—a Corporation long distinguished for a selfish and monopolizing spirit, to which may be ascribed not a few of the evils at this moment most bitterly complained of by medical men. As at present constituted this ancient body can, however, exert but little influence in the correction of those evils, its power being limited to London, and an extent of seven miles around the metropolis.

"Out of several thousand members of the Royal College of Surgeons in London, not more than *one hundred* are really eligible to seats in the Council. The charter of this College confers upon it no authority over persons who wish to practise Surgery; its diploma is *honorary;* the examination necessary for its attainment is self-imposed on the part of the candidate; and as the Society of Apothecaries takes no cognizance of Surgery, any one is at liberty to practise that branch of the healing art in England, without being required to prove that he has paid the least attention to the study thereof.

"The Society of Apothecaries is authorised (or, rather, is supposed to be authorised) to prevent persons practising as apothecaries without its license; but the difficulty of proving who is, and who is not an apothecary, according to the meaning of the statute, and the great expense incurred by legal proceedings, have prevented the Company from exercising the power entrusted to it by Parliament, except in a very limited number of instances; whilst many hundreds of persons are daily permitted with impunity to infringe the Act of 1815. The Committee, not unmindful of the improvements in medical education which are attributable to the Society of Apothecaries, are yet of opinion, that the examining and licensing of the majority of the medical practitioners of this kingdom would never, under a proper system of legislation, have been placed in the hands of a trading company.

"Of the medical department of the University of London, the Committee would desire to speak with respect. The new institution has however the same defects as most of its predecessors, in possessing no positive authority or control over medical education or practice. It is likewise open to objection, in being governed by a Council appointed *wholly* by the Secretary of State.

"A state of medical polity so feeble as that which has been described, will easily account for the unrestricted career of empiricism for which this kingdom has long been notorious. The unblushing falsehoods continually put forth and promulgated through the medium of the Press, in support of a system whose injurious and fatal tendency cannot be doubted, are disgraceful to a civilized country; and, strange to say, instead of any legal cognizance being taken of its enormities, they may be said to receive a tacit encouragement from the Legislature, a portion of the public revenue being made to arise from the sale of nostrums and 'universal medicines!'

"A scrupulous, and, perhaps, culpable degree of delicacy has hitherto been observed, by medical men, with regard to the iniquitous practices of empiricism, which may be ascribed to an apprehension lest their interference might subject them to the imputation of being actuated by mercenary and interested motives. Since, however, they, of all persons, must be most familiar with the consequences of quackery, it becomes a duty incumbent upon them to protest against a system, dangerous to society, and too often attended with fatal results to its credulous and unsuspecting victims. Much may be done by legislative enactments, to diminish the evils of empiricism, although they can never, it is feared, be *entirely* suppressed, until many prejudices and erroneous impressions, with respect to health and disease shall have been removed from the public mind.

"Amidst the rapid progress of science, which has distinguished the present century, it must be admitted, that Medicine and Surgery have kept pace with other departments of knowledge; nor can it be denied, that the education of practitioners has been extended in a somewhat corresponding ratio, although still susceptible of great improvement. The course of study prescribed, and examinations instituted, by the various colleges, not, in general, having sufficient reference to *practical* utility. The long space of time which, in accordance with the regulations of the Society of Apothecaries, is consumed in the apprenticeship of the general practitioner, compels him in *most* instances, to compress into a very limited period his study of the whole circle of the sciences connected with a knowledge of Medicine and Surgery; which, as a natural consequence, leads not unfrequently to the acquirement of a vague and superficial kind of information. Too much importance is attached to the possession of testimonials and certificates, which are well known to be bestowed most indiscriminately. They can rarely be received as indications of the student's diligence in attending the means of instruction, and can never mark the extent of his proficiency. The latter is seldom properly tested even by the examinations for license or diploma, which are commonly conducted in a cursory manner, and one but little calculated to ascertain the *practical* acquirements of the candidate.

"It has been already observed, that there are, in the United Kingdom, nineteen different sources from which may be obtained diplomas in Medicine and Surgery, and license to practice. The rights and privileges conferred by particular Corporations are limited in their scope, their members or licentiates being thereby authorized to exercise their vocation in one part of the kingdom, but not in another. Thus, one who has been licensed by the College of Surgeons in Edinburgh, as a general practitioner, cannot legally act in that capacity in any part of England or Wales, unless he have procured, in addition, the license of the Society of Apothecaries, London. The most lucrative surgical appointments in Ireland can be held only by members of the Dublin College of Surgeons; and physicians who practice in London must be licentiates of the Royal College of Physicians of that metropolis. The course of study enjoined, and the examinations instituted, by these separate colleges, differ widely in nature and extent. In some, they are most imperfect, a knowledge of particular branches being required, whilst others are passed over in silence. Hence, a practitioner who possesses merely the diploma of the London College of Surgeons shall not have been examined in the Theory or Practice of Medicine; and he who contents himself with the license of the Apothecaries Company shall have undergone no test as to his acquirements in Surgery. Midwifery is *entirely* neglected by the College of Surgeons, and scarcely touched upon in the examination at Apothecaries' Hall.

"The unity of Medicine and Surgery is too generally acknowledged in the present day, to admit of dispute. It is, in fact, not possible to draw a line of demarcation between them, they being one and indivisible. A very slight experience is requisite to prove the futility of any attempts to separate them in theory, much less in practice. Illustrations without end might be adduced of the mischief arising from an exclusive adherence to one or the other. It follows, therefore, that all persons intending to enter the Medical Profession, should undergo the same preparation for their practical duties; and with this conviction firmly impressed upon their minds, the Committee coincide entirely in the sentiments contained in the petition adopted in July 1839, by the Provincial Medical and Surgical Association, as to the propriety of establishing 'an adequate and uniform education for the whole profession; so that *all who enter it* shall pass through the same course of *preliminary* and professional instruction—be tested by the same examination—and, when approved, entitled to the same privileges. The natural unity of the profession imperatively demands this consolidation, there being no more preposterous and mischievous anomaly than that presented by the existing state of the Medical Institutions of this kingdom, where practitioners of Physic, issuing from sixteen (it might have been nineteen) separate sources, differing from each other in the course of education enjoined, the qualifications required, the examinations by which the qualifications are tested, and the privileges conferred!' The expediency of a liberal preliminary education being made an essential requisite in candidates for medical practice, cannot be too strongly insisted upon; since it must ever afford the best security for the respectability of the profession, and for the maintenance of that honour and moral rectitude by which its members should be distinguished.

"The differences in the curricula of study and examinations already spoken of, leads to a species of competition eminently calculated to lower the standard of professional attainment. It has been found (as might have been naturally expected,) that those examining bodies have been most resorted to, which grant their licenses on the easiest terms, as to length of education and severity of examination. Students from Dublin, for example, have, on this ground, been so much in the habit of deserting their own Colleges, and emigrating to other establishments, as to compel the College of Surgeons of that city, in self-defence, to diminish its scale of education and strictness of examination. Some change is necessary to obviate a disparity so prejudicial to Medical Science, and to effect the uniformity of education, examination, and privilege, so ably advocated in the petition referred to, and the propriety of which seems now, indeed, to be acquiesced in by all who have paid attention to the subject.

"The proposal which, in the present day, has perhaps obtained the greatest number of supporters, as tending to accomplish the last-named objects, and at the same time to regulate the affairs of the profession in general, and to place it under efficient superintendence and control, consists in the establishment of a National Institution of Medicine, composed of three branches—one for England, another for Scotland, and a third for Ireland, founded on similar principles, governed by the same regulations, and having a Representative Council to act as the Executive in arranging and directing all matters of detail, respecting the government, education, and police of the profession, and the care of the public health.

"The desirableness of such an institution scarcely admits of doubt. In considering the probability of its attainment, however, difficulties of no ordinary magnitude present themselves, unless its establishment can be carried into effect, without, of necessity, involving the *destruction* of existing Colleges and Corporate Institutions. The opposition which there is every reason to suppose would be raised by any attempt to supersede entirely the institutions now at the head of medical affairs, might, it is conceived, prove fatal to the cause of Medical Reform, or would, at least, postpone its accomplishment to a distant period of time. The influence possessed by some of these bodies, in certain quarters, is such as to forbid the Committee to entertain the hope of seeing the speedy erection of any new system of Medical Government, whereof they will not, in some way, form a constituent part. The Committee are not prepared to state the exact nature of the changes which, under their present consitution, would be required to render those bodies subservient to the promotion of the objects contemplated in the preceding remarks. They would, undoubtedly, be extensive, and could only be determined after mature and careful deliberation. One of the earliest steps would be to abolish the self-elective system, which now prevails throughout the Corporations in question, and to substitute a more popular mode of election. Without such a change in their respective constitutions, they could form no part of a more comprehensive plan, which could satisfy the profession, or obtain the confidence of the public.

"The practice of Pharmacy, has not, in this country, received the attention which has been bestowed upon it by other European nations; nor has the English apothecary been distinguished by the scientific attainments of the French or German compounder of medicines. Material amendment is here absolutely requisite. Many objections might be urged against some of the methods at present made use of in the compounding of medicines. The indiscriminate and careless manner, also, with which the most deadly poisons are dispensed from the shops of our chemists and druggists, amounts to a national reproach. To arrest, as far as possible, the dangerous consequences arising from the want of some controlling influence in the department of Pharmacy, the Committee think that no person should be allowed to prepare and sell medicines, without obtaining a licence for that specific purpose, which should be granted him after a suitable examination, conducted before a properly constituted Board, such as might be afforded by the Society of Apothecaries, London. It is of vital consequence that a duty so important as the preparation of prescriptions should be placed in the hands of competent and educated persons, who are fully aware of the responsibility they incur in the performance of that duty—whose attention is undivided by other avocations—and whose time is occupied in the *personal* superintendence of pharmaceutical operations. It is conceived that such an arrangement would be alike serviceable to the medical practitioner, and beneficial to the public, as it would most undoubtedly tend, more than any other means, to advance the science of Pharmacy.

The Committee cannot close this Report without adverting to an evil which, perhaps, of all others, has tended most to lower the respectability of the Medical Profession, and to diminish the estimination in which its members might otherwise have been held by society in general, viz. the mode of remuneration hitherto most commonly adopted by the general practitioner. The Committee are confident, that the slightest reflection must convince every ingenuous and enlightened mind, that nothing can be more derogatory than that the education, skill, time, and attention of the medical attendant should be rewarded in proportion to the quantity of medicine supplied to his patient. It is obvious that, by such an arrangement, the practitioner must always be liable to a most odious, and perhaps unjust, imputation, of prescribing with a view to his pecuniary gain, rather than for the exigencies of his patient; and it is most unfortunate that, *under any circumstances*, the slightest temptation should be offered, by such a practice, to overstep the boundaries of the strictest justice and integrity, The Committee are aware that this custom has been, in some localities, abandoned by common consent; and that in almost every town throughout the kingdom, there are individual practitioners who adopt a mode of remuneration more consonant with the character of a liberal profession. The feeling of medical men in general is repugnant to the practice; and its continuance, in the present day, is, in the opinion of the Committee, attributable to the difficulty experienced in relinquishing an established usage, and one which has received an *apparent* sanction, from its having been adopted by men of station and respectability—not, perhaps, from a conviction of its merits, but reluctantly, and in obedience to custom and precedent. In agitating this and other questions wherein their interests are concerned, the motives of medical practitioners are liable to misconstruction; and the too great mystery in which their operations have been hitherto involved, has created in the public mind some degree of jealousy with respect to their proceedings. The Committee trust, however, that such impressions are rapidly dying away, and that the remains of prejudice and error still existing on this and other points connected with medical practice, will yield, as education becomes more and more widely diffused. The differences of opinion amongst medical men may retard the progress of medical legislation in other respects; but, in the meantime, no legal enactment is required to modify or abolish the system under consideration; and it will afford the Committee sincere pleasure, if any representation issuing from this Society shall be instrumental in placing the remuneration of the general practitioner on a just and proper footing.

"The Committee have thus endeavoured to lay before the Association, a brief statement of the existing condition of the Medical Profession in this country. The amendments which have suggested themselves in the course of the inquiry (if briefly summed up,) will be found to consist in the attainment of a sound legal organization for the profession, to whose superintendence shall be confided the direction and control of all matters relating to the public health, and to medical education, practice, and police; the several compartments of which system shall be made subservient to the same end—the protection of the public from the dangerous and fraudulent practices of ignorant and uneducated persons, by requiring a certain standard of qualification from all who enter into medical practice, which shall confer similarity of privilege on members of the profession throughout England, Scotland, and Ireland. The proper registration of legally authorized practitioners—the prevention of illegal practice—the suppression of quackery, so far as that can be effected by legislative interference—the examination and licensing of apothecaries, or compounders and sellers of medicine, &c. &c., being comprised in such scheme of medical government.

"Throughout the preceding observations, the Committee have been desirous to avoid entering into *unnecessary* details, feeling persuaded, that a further consideration of them than has here been attempted, would have been incompatible with the limited nature of the duties assigned to them in the preparation of this Report. The efforts of medical practitioners should, it is conceived, be directed, in the first instance, to the estatablishment of those broad and general principles which should form the basis of an improved constitution for the medical profession. The introduction of minor particulars, amidst the conflicting state of opinions entertained respecting them, would tend to impair that unanimity, which, at the present time, it is desirable to cultivate amongst the members of our profession. It would, furthermore, subject their efforts to the decided hostility of existing institutions, and create, on the part of the Legislature, a disinclination to entertain the difficult and complicated question of Medical Reform."

The Petition of the President and Members of the North of England Medical Association; Humbly Sheweth,—That your Petitioners, (consisting of Physicians and Surgeons resident in the Counties of Northumberland, Durham, and Cumberland,) have for a length of time deplored the evil consequences ensuing, not only to their own body, but to society in general, from the want of an adequate legal constitution for the Medical Profession of the United Kingdom of Great Britain and Ireland.

That questions relating to the Public Health have not hitherto, in the opinion of your Petitioners, received from the Legislature of this country a degree of attention commensurate with their importance. The laws which have been passed with a view to regulate Medical affairs have not been sufficient to guard the public against the pernicious practices of ignorant pretenders to Medical and Surgical skill, or to protect the educated and duly authorised practitioner from an unfair and unjust competition with persons who can produce no evidence of their having made suitable preparation for the responsible and difficult duties involved in the treatment of disease.

That impostors of every description are, in consequence, allowed to prey upon society; and empiricism, in its most aggravated forms, is suffered to pursue an uninterrupted and most dangerous career, to the detriment of the public safety, and the scandal of a great and civilized empire.

That Chemists and Druggists are permitted to prepare and dispense every description of Medicine, and to sell the most deadly poisons, without supervision or control. They are furthermore in the constant habit of taking upon themselves the task of prescribing for diseases with whose nature it is impossible they can be acquainted.

That the Colleges and Corporate Institutions, which at this time preside over the Medical Profession, are wholly unequal to the correction of the abuses complained of by medical men. The constitution of these bodies is defective and objectionable in the extreme, they being for the most part governed by self-elected Councils, the members of which are irresponsible, and hold their offices for life. Your Petitioners would beg to represent, that the Members of their Profession are, from their station and respectability, entitled to the privileges at least of Municipal and Parliamentary Electors, and should be allowed to have some control over the management of any Institution, to which may be committed the protection of their interests.

That the state of Medical Education in Great Britain and Ireland is such as to require considerable amendment, there being in the United Kingdom not fewer than nineteeen sources from whence are obtained diplomas and licenses to practice—each varying from another in the extent of the education thereby enjoined, and the examination instituted, as well as in the privileges conferred. Your Petitioners have no hesitation in declaring such diversity in the education and examination of Candidates for Medical practice, to be not only absurd and unnecessary, but injurious to the cause of science, inasmuch as those institutions will ever be most resorted to by students which afford the greatest facilities (as to duration of study and strictness of examination) in obtaining their diplomas or licenses.

Your Petitioners, therefore, pray that your Honourarable House will adopt such measures as will confer upon the Medical Profession a sound and efficient legal constitution, and place it under a system of government based upon principles which may protect the interests alike of its members and of the public—ensure uniformity of education and examination for all who enter it—prevent illegal practice—and confer reciprocal privileges on Practitioners throughout England, Scotland, and Ireland.

And your Petitioners, as in duty bound, will ever pray, &c.

At the first meeting of the Members of the North of England Medical Association, held at Newcastle-upon-Tyne, January 21st 1840, it was resolved—" That the Report of the Provincial Committee, on the present state of the Medical Profession, be received, and that it be forthwith printed, and circulated, as the Council shall direct."

It was further Resolved—" That the Petition, addressed to the Two Houses of Parliament, be adopted and printed, and that Copies of it be circulated along with the Report."

(Signed) T. E. Headlam, M. D., President.
Charles T. Carter, Secretary."

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PART I.

ORIGINAL COMMUNICATIONS.

Art. I.—*Thoughts on the Excess of Adult Females in the Population of Great Britain, with reference to its causes and consequences.* By John Roberton, late Senior Surgeon in Ordinary to the Manchester Lying-in-Hospital.

In occasionally gratifying a habit of looking over our population tables, I had some years ago learned that there are more females than males above twenty years of age, though without having regarded it as of importance enough to deserve particular consideration. But after chancing to notice that there was an excess of adult women in other European countries as well as our own, I was led to reflect upon the circumstance with more attention, until I saw reason to conclude, that it is probably a law of Nature, conducing to beneficent ends in human society. Women, besides the duties devolving on them as wives and mothers, are called to fulfil many others of great value and importance, which, generally speaking, are most fitly and conveniently performed by the unmarried. Indeed, if we only imagine all the women in Britain to be married early in life, suppose between the fifteenth and twentieth years, as occurs in Mahommedan and Pagan countries, it must be obvious that several unhappy consequences would ensue, to the grievous disarrangement as well as deterioration of social life. For where, in that case, could we find a sufficient supply of female domestic servants, or of nurses and governesses for our children? What substitutes could we discover in protracted family sickness, or in the bereavement of a family by death of one or both parents, in place of unmarried female relatives or friends, who so often vicariously sustain the maternal relation to our children with tender and disinterested fidelity? How, again, but for this generous provision of nature, could the duties of kindness and benevolence to the sick and ignorant poor, abounding in every neighbourhood, be so well performed as they now are? Who besides the class of persons referred to, would visit their abodes, sympathise with, and advise them? Was there not such a class of benevolent, disinterested agents as single women ordinarily are found to be, with their time, their thoughts, and affections more or less disengaged, society, I am persuaded, would present a scene of barbarous selfishness; each family caring exclusively for its own narrow circle, and all excusing themselves from the performance of benevolent actions, on the plea that their sphere of duty was at home. Let any one attempt to depict a condition of society advanced in knowledge and in the practice of morality, but without this excess of adult females, and he will hardly fail on reflection to perceive that one of the elements necessary to its being is wanting.

I before remarked that all the women in Mahommedan and Pagan communities are said to be married under twenty; and the same, did custom permit, might take place in England, notwithstanding the considerable excess of females at every age above the eighteenth or twentieth year; for in this, as well as in other European countries, males outnumber females under adult age. It is subsequently only to this period of life that the female sex preponderates. One thing is unquestionable, that were all our women to marry under twenty, the number of widows (since polygamy is not to be supposed,) must soon be enormously great. As the case now is, there are nearly, as we shall by and by see, thrice as many widows as widowers; and, were all the female sex to marry as above, that high proportion would necessarily be augmented.

The proportions of males and females at different periods of life in the population of England, is thus expressed by Mr Finlaison, in a passage which I extract from a letter addressed by him to the Registrar-General, and published in that officer's first report. "The population of England is such, that for 1,000,000 females there are to be found 980,322 males. It is probable that the sexes coexist in equal numbers at all times, and that the deficiency of about 2 per cent. of the males is occasioned by an excess of emigration on the part of that sex." "Though they, (the two sexes,) are created in such an order, that for every 1,000,000 of females born alive, there are 1,050,985 males; [in round numbers, 20 males to 19 females,] although nothing can be more variable than the births and deaths of different years, and the rate of mortality of the several sexes at different periods of life; yet, by a series of the most complicated laws, the wonderful result is not only to keep the proportion of each sex to the other continually uniform, but also to render them absolutely equal in numbers on turning the age of eighteen.* Before that age the males predominate, and after it the females; such at least was the case in England during the eighteen years ending in 1830."

Of course the excess of females referred to by Mr Finlaison, amounting to upwards of 2 per cent. in the entire population, is nearly 4 per cent. among adults, since males predominate till the eighteenth or twentieth year; and the proportions of the population under and above the latter age are not far from equal. In reality, the excess of adult females in the community is considerably more even than this, owing to the military and naval services, and the mercantile marine, statedly employing, without the boundaries of the kingdom, a large number of adult males. From one of Mr Finlaison's opinions in the passage quoted I am obliged to dissent. It is probable, he remarks, that the sexes co-exist in this country in equal numbers at all times, and that the deficiency of about 2 per cent. of the males is occasioned by an excess of emigration on the part of that sex. Here I imagine there must be an oversight. Mr Finlaison will not deny the greater value of female than of male life, for no one has so fully illustrated this point as himself. The deficiency of males, therefore, we may fairly conclude, is occasioned partly by emigration and by foreign employments, in which so many spend the vigour of their days; and undoubtedly in part by the greater liability of the male sex to a premature death; that is, by each successive generation of males passing off the scene somewhat more rapidly than the corresponding generation of females. We shall find, by an examination of the proportion which the sexes bear to each other in European countries, as compared with the United States of America, that emigration alone does not account for the excess of females in question.

The superior duration of female life has been long known; but its degree has only been ascertained and divulged of recent years; and chiefly, I believe, by the successive labours of Milne, Finlaison, and Rickman. From a calculation made on 1002 lives belonging to a Tontine established in 1695, terminated by the death of the last annuitant in 1783, Mr Finlaison found, that, amongst these, female life exceeded male life no less than 10 per cent. He further calculated on 25,000 lives connected with various Tontines and other government annuities, current from 1785 to 1825, and found the advantage in favour of female life to be still higher than in the preceding instance, namely, 13 per cent. By another calculation, exhibiting the results of the Parish Register return of ages of those buried from 1813 to 1830, to the extent of nearly four millions, it was discovered that the value of female exceeded that of male life 4 per cent. These important calculations afford two distinct classes of results,—*first*, those lives in the Tontine terminating in 1783, and those other 25,000 lives, the subject of calculation up to 1825, belonged to the comfortable classes of society; and here the advantage in favour of females was, in the earlier instance as to date, 10 per cent., and in the later no less than 13 per cent.; and *secondly*, the results obtained from the population of all ranks gave an advantage in favour of females of 4 per cent. On these curious facts Mr Rickman, from whose interesting paper in the London Medical Gazette* I gather my information, has the following remarks:—" That the increase of civilisation should have protected the female sex from hardships of all kinds, especially exposure to inclement weather; and that this advantage, added to their habitual estrangement from excess in diet and exercise, should have lengthened life 10 per cent. beyond that of the male sex, is not incredible, nor very surprising; but that this advantage (for long life is but another word for comfortable life) should have been increased to 13 per cent., by the progressive refinements of the last century, is a fact which nothing but ample experience could have established.

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* This result Mr Finlaison arrives at by a method of calculation: it is not founded of course on the ages of the population actually obtained, since this was accomplished only, (and then but partially,) by the single census of 1821.

" The advantage of the female sex in the aggregate is found to be 4 per cent. in longevity—a difference sufficiently explainable by their comparative exemption from hard labour and bad weather; and this graduated diminution of advantages, as compared with that of the select classes, leads to a persuasion that no advantage whatever existed in favour of the uncivilized female."†

These observations, considering the high authority they emanate from, deserve attention: but I question if it ought to be conceded that the superior longevity of females is owing solely to their greater temperance and greater freedom from hardships, than males; when we reflect that males exhibit a higher rate of mortality throughout nearly the entire period of life than the other sex. Among the still-born there are more males than females; and during the first two years of existence, when the causes mentioned by Mr Rickman cannot be supposed to influence the one sex more than the other, male life is unquestionably the more precarious—a fact shown in all tables of mortality without, I suppose, a single exception. In a large town, few mothers of numerous families would need be told that female infants are less troublesome to rear, and that in severe illness they display more tenacity of life than males; since these are generally-received opinions founded on experience.

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* Vol. xvi. p. 586.

† Rickman in Medical Gazette, ut supra.

When the census was taken for 1821, there was an attempt to ascertain the age of persons then living, discriminating the sexes; which succeeded so far as to exhibit the ages of 12,487,377 out of 14,072,331 that formed (exclusive of the army, navy, and mercantile marine, amounting to 319,300), the population of Great Britain. The following table shows the relative proportions of the sexes, at different periods of life, as also of all ages, in the aforementioned 12,487,377 persons.

Under the age of 20 for every 100 males there were	98.77 females.
From 20 to 30,	121.33
30 to 40,	111.38
40 to 50,	105.83
50 and above,	108.58
Of all ages for every 100 males,	105.56

By this table it will be noticed that males outnumber the other sex under 20; and that, in the next ten years, females greatly preponderate. Of course, the army, navy, and mercantile service, which absorb 319,300 males, chiefly in the prime of life, would, if classed according to their ages, reduce the proportion of females between the twentieth and fortieth years; but even supposing this rectification made, the excess of females within this period would still be very considerable.

Mr Rickman appears to suspect the return of female ages between twenty and thirty years as not altogether trustworthy, in so much that he seems to advise calculators to rely on the table of male ages only.* It is not unlikely that some women would hesitate to admit their having passed the thirtieth year, and might from vanity give a false return; but, as in every county in the island, excepting Monmouth, and even in perhaps every town and city, a considerable excess of females betweeen the above ages appears on the face of the returns, such uniformity is presumptive evidence that the table of female ages is worthy of credit. Besides, the same excess is found in other old countries whose population, as to general circumstances, resembles our own; even in several of the New England States: and, further, if it be true that there are more adult females than males, (and this will not admit of dispute,) the ages of those forming that excess are most likely to appear in the largest preponderance, at a period of life at which the greatest number of males is withdrawn, on military, naval, and other descriptions of foreign service.

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* Rickman's Enumeration and Parish Registers of Great Britain, in 1821, published 1822.

Taking England, Wales, and Scotland separately, the excess of females, as might be anticipated, is greatest in Scotland, owing to the extensive emigration of males constantly going on; and from the absence, comparatively speaking, of such emigration, is smallest in Wales.*

Scotland, 1821.

Under 20 years for 100 males,	99.78 females.
20 to 30, . .	132.01
30 to 40, .	123.01
40 to 50, . .	117.20
50 and above, .	129.53
Of all ages, . . .	111.87

England, 1821.

Under 20 years for 100 males,	98.71 females.
20 to 30, . .	119.62
30 to 40, .	109.38
40 to 50, . .	103.49
50 and above, .	105.52
Of all ages, . . .	104.42

Wales, 1821.

Under 20 years for 100 males,	96.89 females.
20 to 30, . .	113.96
30 to 40, .	109.72
40 to 50, . .	109.47
50 and above, .	116.15
Of all ages, . . .	104.64

From Scotland not only does a greater tide of emigration flow, in proportion to the population, than from either of the other two divisions of the island; but probably, also, more than its proportion of soldiers and sailors; hence an excess of females in the population, exceeding by 4 per cent. that of England or Wales. From England, it is probable, a larger proportion of adult males emigrate than from Wales; as also from the absence of large towns, that a smaller proportion of male infants and youth die in the latter. Owing chiefly, perhaps, to these two circumstances, the excess of marriageable females in England (of females, I mean, between the ages of 20 and 40,) is 3 per cent. greater than in Wales.

But it will more plainly appear what are the relative proportions of males and females at different ages in different parts of the island, by taking singly a few counties and cities, each differing, more or less, from the remainder in regard to the numbers as well as the social condition of the population. The return afforded by the census of 1821, as to the ages of persons, was complete for some counties and cities, and more or less incomplete for others. I have taken, without selection, specimens from each of the three divisions of the island, the returns in all those instances, giving the ages and sexes in a complete form, or with only omissions too trifling to be of any importance.

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* Here I must except a considerable emigration of young women to the low lands of England, for the purpose of domestic service—an addition of females which must sensibly add to the excess of the sex in England, particularly in towns. The same fact may also partly explain how, in Wales, adult females preponderate less than in the other two divisions of the island.

Scottish Counties and Towns.

Shire of Haddington.

Under 20 for 100 males,	104.54 females.
20 to 30,	123.67
30 to 40,	123.44
40 to 50,	113.35
50 and upwards,	129.02

Shire of Ayr.

Under 20 for 100 males,	100.14 fem.
20 to 30,	126.37
30 to 40,	115.86
40 to 50,	112.89
50 and upwards,	115.57

Shire of Dumfries.

Under 20, for 100 males,	101.63 fem.
20 to 30,	134.86
30 to 40,	122.84
40 to 50,	117.06
50 and upwards,	122.15

Shire of Bute.

Under 20, for 100 males,	99.58 fem.
20 to 30,	134.68
30 to 40,	127.82
40 to 50,	126.26
50 and upwards,	121.75

Shire of Sutherland.

Under 20, for 100 males,	100.61 fem.
Under 20 to 30, for 100 m	131.31 fem.
30 to 40,	132.84
40 to 50,	130.17
50 and upwards,	127.73

Shire of Renfrew.

Under 20, for 100 males,	102.81 fem.
20 to 30,	119.09
30 to 40,	111.69
40 to 50,	106.08
50 and upwards,	107.58

City of Edinburgh.

Under 20, for 100 males,	108.10 fem.
20 to 30,	162·33
30 to 40,	126·02
40 to 50,	118·31
50 and upwards,	141.30

City of Glasgow.*

Under 20, for 100 males,	103.28 fem.
20 to 30,	146.56
30 to 40,	125.41
40 to 50,	111.61
50 to 60,	131.84
70 to 80,	131.14
80 to 90,	152.33
90 to 100,	240.00
100 and upwards,	500.00

England, 1821.

Bedfordshire.

Under 20, for 100 males,	99.94 fem.
20 to 30,	125.29
30 to 40,	120.98
40 to 50,	107.52
50 and upwards,	105.22

Cumberland.

Under 20, per 100 males,	95.11 fem.
20 to 30,	115.60
30 to 40,	109.00
40 to 50,	105.40
50 and upwards,	121.43

Cheshire.

Under 20, for 100 males,	98.23 fem.
20 to 30,	118.20
30 to 40,	107.80
40 to 50,	100.71
50 and upwards,	102.88

Leicester.

Under 20, for 100 males,	99.77 fem.
20 to 30,	111.71
30 to 40,	106.92
40 to 50,	100.03
50 and upwards,	90.87

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* This table is taken from Cleland's Statistical Tables, relative to the city of Glasgow, 8vo. 3d edit. 1828.

Rutland.

Under 20, for 100 males,	93.28 fem.
20 to 30, -	112.71
30 to 40, -	101.77
40 to 50, -	106.78
50 and upwards,	106.90

Monmouth.

Under 20, for 100 males,	93.56 fem.
20 to 30, -	89.86
30 to 40, -	89.06
40 to 50, -	88.60
50 and upwards,	100.85

CITIES, &c.

York.

Under 20, for 100 males,	106.26 fem.
20 to 30. -	139.97
30 to 40, -	113.91
40 to 50, -	110.45
50 and upwards,	127.25

Winchester.

Under 20, for 100 males,	91.36 fem.
20 to 30, -	130.33
30 to 40, -	125.35
40 to 50, -	108.10
50 and upwards,	113.54

Liverpool.

Under 20, for 100 males,	107.07 fem.
20 to 30, -	163.35
30 to 40, -	126.72
40 to 50, -	107.73
50 and upwards,	127,19

Bath.

Under 20, for 100 males,	116.88 fem.
20 to 30, -	149.77
30 to 40, -	168.25
40 to 50, -	165.72
50 and upwards,	174.11

Norwich.

Under 20, for 100 males,	108.53 fem,
20 to 30, -	136.65
30 to 40, -	117.61
40 to 50, -	116.77
50 and upwards,	131.43

London, within the walls.

Under 20, for 100 males,	95.80 fem.
20 to 30, -	113.13
30 to 40, -	104.29
40 to 50, -	101.06
50 and upwards,	110.35

WALES, 1821.*

Brecon.

Under 20, for 100 males,	96.02 fem.
20 to 30, -	103.00
30 to 40, -	103.84
40 to 50, -	100.20
50 and upwards,	104.93

Carnarvon.

Under 20, for 100 males,	94.02 fem.
20 to 30, -	114.45
30 to 40, -	105.78
40 to 50, -	106.73
50 and upwards,	117.63

Cardigan.

Under 20, for 100 males,	97.21 fem.
20 to 30, -	125.02
30 to 40, -	110.91
40 to 50, -	107.46
50 and upwards,	119.04

Pembroke.

Under 20, for 100 males,	101,06 fem.
20 to 30, -	140.36
30 to 40, -	105.81
40 to 50, -	120.50
50 and upwards,	126.20

Carmarthen.

Under 20, for 100 males,	96.94 fem.
20 to 30, -	119.96
30 to 40, -	118.30
40 to 50, -	117.31
50 and upwards,	118.70

Radnor.

Under 20, for 100 males,	96.50 fem.
20 to 30, -	101.35
30 to 40, -	105.40
40 to 50, -	101.33
50 and upwards,	130.20

Some of these tables are curious, as exhibiting an extraordinary excess of females. In those for several cities it is too remarkable to be overlooked. In the city of Bath, for example, it is upwards of 50 per cent. between the ages of 20 and 50 years. The table for the county of Monmouth presents a singular exception to the general result; but here the iron trade flourishes, and the population was more than doubled between the years 1801 and 1831; partly by an amazing influx of males, who, from the nature of the chief occupations, are necessarily in much demand.[*] When we have to speak of the United States, Monmouthshire, it will be found, affords a social feature connecting in the way of resemblance this old fully peopled kingdom, and the newest states of the Union; in which the male sex, at every period of life, are in portentous excess. The following tables illustrate the relative proportions of the sex as they occur in several of the continental countries. Although my tables are not so numerous or by any means so minute, as to particulars, as could be desired, owing to my having only a very limited access to foreign statistical documents, they may nevertheless be thought to afford, in the way of comparison, some proof of the fact that females of adult age are in excess in neighbouring States as well as in Britain.

Sweden in 1830.[†]

Under 20 years, for 100 males,	there are	100.22	females.
20 to 25,		103.23	do.
25 to 30,		103.67	do.
30 to 35,		103.90	do.
35 to 40,		107.47	do.
40 to 45,		114.10	do.
45 to 50,		118.11	do.
50 to 55,		120 21	do.
55 to 60,		125.11	do.
60 to 65,		134.11	do.
65 to 70,		138.39	do.
70 to 75,		143.92	do.
75 to 80,		153.24	do.
80 to 85,		172.69	do.
85 to 90,		180.77	do.
90 to 95,	after the rate of	220.73	do.
95 to 10,		229.62	do.
100 and above,		500	do.
Of all ages for 100 males,		107.68	females.

Norway in 1835.[‡]

In the total population	there are	100 males to	104 females.
town	do.	100	109 do.
rural	do.	400	103 do.

Denmark in 1834.[§]

In the total population, there are 100 males to 102.20 females.

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[*] In the year 1801, the population of Monmouthshire was 45,582: females exceeding males by upwards of 1200. In 1831, the population was 98,130, giving an increase of more than 115 per cent. in 30 years. Excess of males over females, upwards of 4000 or about 8 per cent.

[†] See article "Mortality, Human," by Joshua Milne, Esq. Encyclop. Britannica, 7th edition.

[‡] Statistics of the Population of Norway, by Professor Fallati, Journal of the Statistical Society, Part iv. Vol. ii. p. 276.

[§] A Notice of the last Census of Denmark, by Professor C. N. David, Ibid. p. 279.

Iceland.[*]

In the total population there are 100 males to 110 females.

Saxony, in 1837.[†]

Under 21 years, there are	100 males to	103.74 females.
20 and 50, .	100	107.56
50 and above,	100	105.62
Of all ages there are	100	105.50

Bohemia in 1827.

In the total population, there are 100 males to 111 females.

Baden.

In the total population, there are 100 males to 104.30 females.

Bavaria in 1828.

In the total population, there are 100 males to 103.86 females.

France in 1836.[‡]

In the total population, there are 100 males to 103.70 females.

Sicily.[§]

In the total population, there are 100 males to 102.97 females.

Cadiz (Spain) in 1837.[‖]

In the total population, there are 100 males to 114 females.

According to Mr Finlaison's calculation, as we have seen, the female exceed the male sex in England by little more than two per cent. This includes males employed in the army, navy, and mercantile marine. In France, according to the elaborate work now in course of publication, "Statistique de France," the females compared with males, including the army and navy, are in the proportion of 103.70 of the latter to 100 of the former; a difference between that country and this so very great as to lead to suspicion of inaccuracy in some quarter.

That the excess of adult females in Europe does not arise solely from the emigration of males, will appear from the relative proportions of the sexes in the United States of America, a country receiving more emigrants from Europe than all the European colonies together.[¶] In a number of the older states, as of New England, the sexes exist in nearly the same proportions, at least above the 20th year, as in England. In some of these the excess of females between the ages of 20 and 40 is very considerable. Males, however, predominate, but not greatly, in most of the Atlantic and middle states; while in the southern, (excepting Virginia and North Carolina, in which females abound,) and the more recently formed states, males greatly outnumber females. In these states and territories, again, the most recent of all, the excess of males is so remarkably great as to indicate a strange and anomalous condition of society. The tables which follow are too plain and intelligible to require much comment.

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[*] A Notice of the last Census of Denmark by Professor C. N. David. Journal of the Statistical Society, Part iv. Vol. ii. p. 279.

[†] Statistics of the Population of the Kingdom of Saxony, by M. W. Deverell, Esq. Statistical Journal, Vol. i. No. 9.

[‡] Statistique de France publiée par le Ministre des Travaux publics, &c. 1837. 4to.

[§] Giornale di Statistica, No. 8 of Sicily. Palermo, 1839.

[‖] Statistics of Cadiz, by Lieut.-Col. W. H. Sykes, Statistical Journal, Vol. i. No. 6.

[¶] In the free white population of the United States, which in the year 1830 was 10,526,248, the excess of males was only 184,018; whereas in France alone, to say nothing of the rest of Europe, there was an excess of females, according to the census of 1836, amounting to 619,503. The excess of males in America and in the European colonies must be tenfold what it really is, to be equal to supplying a cause for the existing excess of females in Europe.

United States 1830.[*]

Total free White Population.

Under 20 for 100 males, there are	96.99 females.
20 to 30,	96.01
30 to 40,	93.78
40 to 50,	96.98
50 to 60,	97.47
60 to 70,	97.20
70 to 80,	100.97
80 to 90,	110.29
90 to 100,	123.56
100 and upwards,	77.14
Of all ages for 100 males,	96.56

The States separately.

NEW ENGLAND.

New Hampshire.

Under 20, for 100 males,	95.83 females.
20 to 30,	115.91
30 to 40,	113.56
40 to 50,	110.43
50 and above,	117,02
Of all ages for 100 males,	104.84

Massachusetts.

Under 20, for 100 males,	98.41 females.
20 to 30,	103.19
30 to 40,	107.70
40 to 50,	112.67
50 and above,	126.37
Of all ages for 100 males,	101.35

Rhode Island.

Under 20, for 100 males,	99.09 females.
20 to 30,	109.23
30 to 40,	107.08
40 to 50,	114.57
above 50,	130.12
Of all ages,	106.51

Connecticut.

Under 20, for 100 males,	95.08 females.
20 to 30,	101.42
30 to 40,	108.02
40 to 50,	113.06
above 50,	120.87
Of all ages, for 100 males,	102,45

Maine.

Under 20, for 100 males,	96.24 females.
20 to 30	101.74
30 to 40,	102.57
40 to 50,	97.49
above 50,	101.25
Of all ages for 100 males,	98.44

Vermont.

Under 20, for 100 males,	97,45 females.
20 to 30,	104.01
30 to 40,	103.11
40 to 50,	106.04
above 50,	97.23
Of all ages for 100 males,	99.84

ATLANTIC OR MIDDLE STATES.

New York.

Under 20, for 100 males,	98.07 females.
20 to 30,	95.55
30 to 40,	92.65
40 to 50,	93.38
50 and above,	95.16
Of all ages,	96.34

New Jersey.

Under 20, for 100 males,	95.57 females.
20 to 30,	96.61
30 to 40,	96.47
40 to 50,	99.67
50 and above,	105.04
Of all ages,	96.85

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[*] Census of the United States for 1830, published in the American Almanac for 1833.

Pennsylvania.

Under 20, for 100 males,	97.61 females.
20 to 30, -	95.50
30 to 40, -	92.59
40 to 50, -	95.24
50 and above,	100.42
Of all ages, -	96.73

Delaware.

Under 20, for 100 males,	98.41 females.
20 to 30, -	97.74
30 to 40, -	99.15
40 to 50, -	100.54
50 and above,	109.44
Of all ages, -	99.69

Maryland.

Under 20, for 100 males,	99.42 females.
20 to 30, -	92.68
30 to 40, -	91.22
40 to 50, for 100 m	97.90 females.
50 and above,	107.19
Of all ages, -	97,57

SOUTHERN STATES.

Virginia.

Under 20, for 100 males,	98.46 females.
20 to 30 -	101.86
30 to 40, -	99.77
40 to 50, -	101.57
50 and above,	107,35
Of all ages, -	99.57

North Carolina.

Under 20, for 100 males,	96.82 females.
20 to 30, -	105.60
30 to 40, -	106.47
40 to 50, -	109.53
50 and above,	101.004
Of all ages, -	100.30

South Carolina.

Under 20, for 100 males,	96.89 females.
20 to 30, -	98.70
30 to 40, -	96.19
40 to 50, -	101.60
50 and above,	97.42
Of all ages, -	97.45

Georgia.

Under 20, for 100 males,	97.21 females.
20 to 30, -	89.53
30 to 40, -	86.49
40 to 50, -	88.31
50 and above,	88.89
Of all ages, -	93.62

MORE RECENT STATES AND TERRITORIES.

Alabama.

Under 20, for 100 males,	95.50 females.
20 to 30, -	82.89
30 to 40, -	75.08
40 to 50, -	77.87
50 and above,	76.55
Of all ages, -	88.80

Kentucky.

Under 20, for 100 males,	95,002 fem.
20 to 30, -	91.33
30 to 40, -	89.25
40 to 50, -	96.93
50 and above,	86.20
Of all ages, for 100 males,	93.83

Mississippi.

Under 20, for 100 males,	93.55 females.
20 to 30, -	72.28
30 to 40, -	66.73
40 to 50, -	71.94
50 and above,	65.11
Of all ages, -	83.13

Indiana.

Under 20, for 100 males,	95.41 females.
20 to 30, -	94.84
30 to 40, -	87.70
40 to 50, -	87.59
50 and above,	76.99
Of all ages, for 100 males,	92.96

Louisiana.

Under 20, for 100 males,	100.05 females.
20 to 30, -	66.26
30 to 40, -	54.05
40 to 50, -	53.67
50 and above,	66.62
Of all ages, for 100 males,	79.48

Missouri.

Under 20, for 100 males,	94.32 females.
20 to 30, -	78.86
30 to 40, -	72.28
40 to 50, -	74.62
50 and above,	78.23
Of all ages, for 100 males,	86.94

Arkansas.

Under 20, for 100 males,	93.18 females.
20 to 30, -	70.97
30 to 40. -	59.72
40 to 50, -	60.27
50 and above,	62.20
Of all ages, for 100 males,	80.84

Illinois.

Under 20, for 100 males,	94.60 females.
20 to 30, -	84.73
30 to 40, -	77.62
40 to 50, -	81.04
50 and above,	71.50
Of all ages, for 100 males,	88.98

Tennessee.

Under 20, for 100 males,	95.48 females.
20 to 30, -	95.52
30 to 40, -	93.76
40 to 50, -	101.03
50 and above,	83.30
Of all ages, for 100 males,	94.76

Michigan Territory.

Under 20, for 100 males,	90.17 females.
20 to 30, -	57.87
30 to 40, -	51.07
40 to 50, -	58.92
50 and above,	57.36
Of all ages, for 100 males,	72.53

Ohio.

Under 20, for 100 males,	96.23 females.
20 to 30, -	92.96
30 to 40, -	88.95
40 to 50, -	88.53
50 and above,	83.20
Of all ages, for 100 males,	93.51

Florida.

Under 20, for 100 males,	97.88 females.
20 to 30, -	66.68
30 to 40, -	55.20
40 to 50, -	63.68
50 and above,	58.28
Of all ages, for 100 males,	79.61

DISTRICT OF COLUMBIA.

Under 20, for 100 males,	104.24 females.
20 to 30, -	101.81
30 to 40, -	96.42
40 to 50, -	91.76
50 and above,	107.79
Of all ages, for 100 males,	101.97[*]

The various tables and statements we have had in review warrant, perhaps, the following corollaries :—

1*st*, In every country the sexes are born in unequal numbers, the proportions being in general 19 females to 20 males. Nevertheless, by the 18th or 20th year of life, the sexes are to be found in nearly equal numbers in all European countries, owing chiefly to the greater mortality of males.

2*d*, Above the 18th or 20th year, in well peopled countries, in the older states of North America, as well as in Europe, females

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[*] As a matter of curiosity I here give tables of the free people of colour, as also of the slaves. I am far too little acquainted with the social condition of these classes of the American population to venture any comments.

FREE PEOPLE OF COLOUR.

Proportion of the sexes at all ages for 100 males,	108.20 females.
Under 24, - - -	104.04
24 to 36, - -	117.68
36 to 55, - - -	109.02
55 and above, - -	117.26

SLAVES.

Under 24 for 100 males,	98.55 females.
24 to 36, -	100.10
36 to 55, -	94.11
55 and above,	99.57
Of all ages for 100 males,	98.36

outnumber the other sex; the excess of females between the ages of 20 and 30 actually living in Britain being 21 per cent., and from 30 to 40 years 11 per cent., according to the census of 1821. On the Continent this excess is probably somewhat less; while in several of the New England states, as New Hampshire and Rhode Island, it approximates to that of Britain.

3d, In more recently settled countries, receiving yearly accessions to their population by immigration, females are fewer in number than males, not only as respects the whole population, but at every period of adult life. Thus in Alabama, under the age of 20 there are 100 males for 95 females; between the ages of 20 and 30, 100 men to 82 women; and between 30 and 40 years, the same number of males to 75 females. In Arkansas, Florida, and the Michigan territory, there are more than three adult males for two adult females; and an instance of a considerable excess of males in our own country is found in Monmouthshire, probably from similar causes, namely, the rapid increase of a male population by immigration.

4th, This excess of females over males at every period of adult life in all well-peopled countries is to be attributed, probably, to these three causes; *1st*, The greater liability to premature death in males than females, owing to less natural tenacity of life in the former, as well as greater exposure to accidents, hardships, and cares, and greater proneness, in general, to intemperate indulgences; *2d*, A higher proportion of males emigrating to new countries, or living abroad as merchants; and *3d*, The large number of adult males withdrawn from society beyond seas; (I now refer principally to our own country, in the army, navy, and mercantile service.)

5th, Let any one account for the existence of this excess of adult females as he may, and let what reasonable abatement he pleases be made for errors in the British population returns for 1821, in particular as to the ages of females, still the excess in question, of at least 4 or 5 per cent. will remain; and in several cities, as Edinburgh and Bath, its actual amount is enormously great, being probably in the proportion of three adult women to two adult men.

6th, Seeing that this preponderance of adult females is produced by causes always in operation, and uniform in their effects, and that it will probably increase with the progress of knowledge, wealth, and refinement, is it too much to affirm that in it we detect a natural law? and if so, we may allowably infer that the law exists for beneficent ends.

7th, Observation establishes the above inference; for we know, in fact, that wherever females are considerably fewer than males, *there* society is gross and unfavourable to morals, as is strikingly illustrated by the condition of several of the more recently formed American States, where the manners are coarse and savage, and the standard of morals confessedly low.*

8th, Some of the beneficent ends an excess of adult women subserve have already been adverted to; but the education, the civil rights, and the necessities of women, will claim additional regard, if the fact is once incontrovertibly established, that above the age of 18 years, females, in comparison with the other sex, are more numerous than has been hitherto supposed. I will not assume that this fact is *proved* by the present slight attempt, but if not actually proved, it is at least rendered *highly probable*.

9th, The importance of wisely educating and training the female sex, which is destined to act so conspicuous a part in the drama of life,—a part that will probably become more important in proportion as mankind advances in social refinement,—need not be dwelt on here. My object is merely to allude to it by the way.

10th, The *civil* rights of women are but little regarded according to our laws, which often operate against the sex, in violation of natural equity and even humanity. 1. A husband possessed of real inheritance, dying intestate, the wife obtains only dower, that is, one-third of the profits it yields. 2. A son, though younger than all his sisters, inherits the real property of his father; and, should he die unmarried and intestate, leaving neither brother nor sister, it passes to the next heir, or, in default of heirs to the lord, of whom the land is held, by escheate; but his widowed mother cannot inherit or receive any further benefit from it. 3. A woman's personal property, by marriage, becomes absolutely her husband's, which, at his death, he may leave away

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* The following are the relative proportions of white free males and females in certain of the British Colonies, taken from a recent publication drawn up from documents in the Colonial Office. The great excess of males in most of the instances, may, in some degree, account for the loose manners said so generally to characterize British Colonial Society.

A. D. 1836,	Trinidad for 100 males there were	71.83 females.
1833,	Tobago,	22.58
1834,	Grenada,	34.89
1836,	St Lucia,	96.81
1833,	Dominica,	88.48
1828,	Antigua,	73.83
1834,	Montserrat,	111.18
1836,	Bermudas,	169.00
1827,	Demerera, Essequibo, Berbice,	41.05
1833,	Honduras,	55.94
1832,	Mauritius,	82.35
1836,	Western Australia,	49 27
1836,	Van Diemen's Land,	66.18

Vide Statistics of the Colonies of the British Empire, &c. published by the authority of Government, royal 8vo. 1840. Understood to be edited by Montgomery Martin, Esq.

from her; or, if he should die without a will, she receives only one-third of his personalty, (and this may consist solely of what was once *her own*,) if he has children, or if not one-half. 4. Although a husband can be tenant by courtesy of the estates in tail of his wife, that is to say, enjoy the profits of them during his life, the wife cannot even have dower of the estates in tail of her husband. 5. Estates or tenements given to a man or his heirs-male, (an immense proportion, as is well known, of the property in Britain is thus held,) if he die and leave sons, the elder enters, and may die leaving only daughters, in which case, not they, but the brother next of age inherits; and should all the brothers inherit and die in succession, each leaving only daughters, the property passes away without benefiting such female issue. The iniquity of laws like these at once appears, when we discover, what probably has never been thought of, that widows are much more than twice as numerous as widowers, added to which is the fact, that there are more *single* adult women than men.* Taking the entire population of France in 1836, there were found to be 1,617,700 widows, and only 740,169 widowers, or 218.57 of the former for 100 of the latter. In cities, especially in those where the upper ranks reside, the proportion of widows is much higher. In Paris for 100 widowers, there were 324.74 widows; in Versailles, 303.10. These are aristocratic cities. In the large, but in comparison plebeian cities of Lyons and Strasburg, widowers were fewer, being 274.67 for the former, and 203.55 for the latter. What proportion widows bear to widowers in Britain, we have not the means of knowing, but there is no obvious reason why it should not be equal to what it is in France. Assuming that it is so, the civil rights of women who marry, thereby rise in importance; and there is a further consideration not to be lost sight of, namely, that the value of female when compared with male life is, (as was formerly shown,) much greater in the middle and upper ranks, than in the population in general; or, to express the same thing in other words, in those classes of the community who have nearly all the real and personal property of the country to bequeath, the proportion of widows and of single women will be found the greatest.

11*th*. In the 33½ millions of population of France, and probably in the population of Britain also, there are upwards of 218 widows for 100 widowers; and in all fully-peopled countries, adult females, as has been repeatedly said, exceed in number adult males, by upwards of 4 per cent. Hence it is that we find, in every European community, a very large number of necessitous and destitute females, widowed or single, such as are known in Scotland by the significant appellation, "lone women;" persons who, having no means at any period of their lives of obtaining high wages out of which to save, are at best able to earn a bare subsistence; and, in fact, are generally immersed in poverty, or fated to endure a lingering death from starvation. We may hope that their numbers and other claims to humane consideration will yet secure for this class of females, as the influence of Christianity spreads, a treatment such as may, in a sense, compensate for that contempt which, especially when aged, they have ever experienced in all countries not excepting our own. *

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* I wish to express myself without positiveness in regard to this latter point. There is undoubtedly a large excess of *single* women at advanced ages; but the number of widowers who marry a second or a third wife, selected, for the most part, from the single class, and the comparatively small number of widows who are again married, must tend materially to keep down an excess of single women between the ages of 20 and 40. But here we need data, (which, it is to be hoped, the census of 1841 will supply,) before a decided opinion can be formed.

ART. II.—*Some considerations on the nature and Pathology of Typhus and Typhoid Fever, applied to the solution of the question of the identity or non-identity of the two diseases.* By ALEXANDER P. STEWART, M. D. (Read before the Parisian Medical Society on the 16th and 23d of April 1840.)

IT is my object, in the following pages, to attempt, by a reference to facts, the elucidation of a question, which is confessedly surrounded with difficulties, and has called into the field of controversy some of the most gifted men of the present day,—some of them espousing one opinion, some another, while others still suspend their judgment, till the production of new facts and reasonings shall have dissipated, in part at least, the darkness in which the subject is involved. It is, indeed, not a little remarkable that, in a country like Great Britain, where typhus sacrifices yearly its thousands of victims,—where it is all but universally admitted that the local lesion of the intestinal follicles is not a characteristic sign of the disease,—and where, on that very ground, the doctrines of Broussais have never been able to establish themselves, there should still be awanting any standard work upon the nature, symptoms, and necroscopic appearances of typhus, such as those of Chomel, Louis, and others, who, on this side the channel, have achieved the triumph of pathological science in a class of diseases, of which the anatomical lesions were so long unknown. Hence the uncertainty that prevails in France in regard to the question I have chosen for consideration—a question which, beyond a doubt, has been for a dozen years, and is still, exciting an interest here, to which British medical men are comparatively strangers. Hence the tours of inspection undertaken from time to time by distinguished continental physicians, with a view either to weaken the conclusions that may be drawn from facts already published, or to dispel a scepticism which these facts, so limited in number, have not been able to overcome. Hence also the objections naturally enough raised to the information collected by them, on the ground of defective opportunities, hurried observation, and imperfect knowledge. Hence, in short, such reflections on the doubtful character of the information received from English authors, as are made by Chomel in his Lectures on Typhoid Fever, those of MM. Gauthier de Claubry and Montault, in their prize essays on the Analogies and differences between Typhus and Typhoid Fevers, and the following words of Valleix,* in apology for citing American instead of English authors, in reference to fevers prevalent in Great Britain. "We admit that it would have been better to have presented a series of observations on typhus made in England itself; but where can we find them?"

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* See Dr Alison's pamphlet "On the management of the Scottish Poor," for a full exposure of the abject condition, and inhuman neglect of the poor, especially of the female portion, in Edinburgh and elsewhere in Scotland.

These observations will derive great additional weight from a brief consideration of the work of Dr Tweedie, entitled Clinical Illustrations of Fever, which is referred to by most of the French writers on the subject, and whence a great part of their ideas on English typhus is drawn. I confess I have been puzzled, in perusing the above named treatise, to find out what definite meaning the distinguished author attaches to the word "fever;" whether he understands by it a symptom produced by a local affection, or a distinct disease arising from a specific cause. His valuable remarks upon contagion, and his strictures upon the doctrines of Broussais, would lead to the latter, while the cases detailed give countenance to the former supposition. I cannot better or more shortly give an idea of the cause of my difficulty, than by giving an analysis of the cases referred to.

Of 73 patients who died, 54 were inspected. Of the latter number, 10 seem referable to typhus and 17 to typhoid fever. Of the remaining 27, I find that 4 died of well-marked and extensive meningitis, 1 of phrenitis, 2 of erysipelas of the head and neck, 5 of phthisis, 4 of pleuro-pneumonia, 3 of pneumonia, 2 of pleuro-pericarditis, 1 of pleuritis, 1 of pulmonary apoplexy, 1 of abscess of lung, 4 of peritonitis. Two of the above cases were sequelæ of scarlatina and small-pox. Of those cases which were not inspected, there are, as far as can be gathered from the brief account of symptoms, 5 of typhus, 3 of typhoid fever, 3 of meningitis, 2 of pneumonia, and 1 of phthisis. Of several, it is stated that they were evidently cases of purely head, chest, or abdominal affections, and in one, which was proved by dissection to depend on intus-susception and gangrene of a considerable portion of gut, it is remarked, that "the symptoms were referable to some obstruction in the intestines, rather than to any form of fever." In the above summary, I have been careful to exclude those that were evidently, or appeared to be *sequelæ* of continued fevers, and to include those only in which the feverish symptoms clearly depended, throughout their course, on local affections. Deducting, however, those I have alluded to, and which form rather more than the half of the cases detailed, there still remain 35, more or less clearly marked out as belonging to two kinds of specific fevers, the one differing from the other in the extraordinary gravity of its symptoms, the rapidity of its course, and the absence of local lesions.

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* Arch. de Medecine, 3d series, Vol. iv. p. 216.

This leads me to remark, in concluding these preliminary observations, that when I began, in 1836, the practical study of fever, I was much struck with the simultaneous occurrence, in the wards of the Glasgow Fever Hospital, of two sets of cases, in which the symptoms (however little most of them might seem to differ, when viewed individually,) presented, when taken collectively, characters so marked as to defy misconception, and to enable the observer to form, with the utmost precision, the diagnosis of the nature of the disease, and the lesions to be revealed by dissection. More particularly, it was remarkable to observe that while, in the one disease, the affection, in those who presented no eruption, was so slight and of so short duration, as to make it very questionable whether it deserved the name of typhus, and while the fatal cases presented an abundant and generally a profuse eruption; those labouring under the other, which equally, and even in a much higher proportion, went on to a fatal termination, rarely presented any, and then only a very scanty eruption. It was further remarkable, that while in the one several successive patients had either been restored to health, or fallen victims to the severity of the affection, the disease, under which those laboured, who lay side by side with them, though characterized by much less urgent symptoms, pursued its gradual course through weeks and months consecutively, and in the majority of cases to a fatal issue. And finally, it was more remarkable still, that, to complete the contrast already so striking, dissection proved the existence, in the one disease, of most extensive local lesions, in the other, the absence of all prominent local lesion whatsoever.

Another circumstance, I must not forget to mention, viz. that though, during the summer and autumn of 1836, the cases of typhoid fever were numerous; from the month of November in that year, (at which time both the type and the amount of typhus became much more formidable,) till June 1838, the period that my connection with the hospital ceased, not more than a dozen cases—if there were even so many, and these at long intervals, were admitted for treatment. In speaking of the two varieties of fever as totally different diseases, before going into the proof of the assertion which is the point in dispute, I have merely employed a phraseology in common use, of which even those who maintain the complete identity of the affections have not been able to rid themselves, and whereon, if I were disposed to insist upon words, I might found a strong argument in support of my position; and have expressed a conviction forced upon me by the consideration of facts and reasonings, which I now proceed to unfold.

It is far from my intention, in this paper, to take up in all its bearings the vast subject of the "analogies and differences between typhus and typhoid fever." That task I hope to be able, along with my friend and fellow-worker, Dr Anderson, to undertake hereafter. My present object is to develope, as shortly and as clearly as I can, some of their leading features of difference, in support of the position I have taken up. I propose, then, to consider, 1. The probable origin of the two affections; 2. Their proximate causes; 3. Their course; 4. Some of their symptoms; 5. Some of their anatomical lesions; 6. Their treatment.

1. Without entering upon the abstruse question of infectious germs, or discussing theoretically the probability of the opinion that ascribes the origin of continued fever to animal, as intermittents are known to proceed from vegetable miasmata, I proceed at once to examine the question in a practical point of view. Dr Copland, in his able article upon Infection, places exanthematic typhus under the third class, viz. that of "specific infections," characterized as "immediately or mediately disseminating and perpetuating their kinds," &c. and directly refers that form of typhus to "emanations from the secretions, excretions, and surfaces of persons already affected." Under the second class, viz. of "conditionally perpetuating or contaminating infections," he places "animal effluvia," or more particularly, "emanations from living bodies in close and unventilated situations." Among the "diseases resulting therefrom," stand "adynamic, putro-adynamic, and malignant fevers." Now, in this classification, it is plain that while we are informed of the origin of the latter, we are only told the mode of propagation of the former. Exanthematic typhus is said to be the result of "emanations from persons already affected;" but whence the original disease? In reference to this question, I observe, that Dr Roupell* had given the weight of his name to the opinion that exanthematic typhus does not originate from vitiated air, extreme filth,

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* Roupell's Treatise, &c. p. 64, quoted at p. 107. Vol. xxxi. of Med. Chirurg. Review.

closeness, &c. I cannot but express my surprise at this opinion, as the amount of evidence against it seems quite overwhelming.

On no two points, (and so far I must anticipate my remarks on the eruption in typhus,) are the distinguished authors who describe the frightful epidemics of army typhus during the last six centuries more completely agreed, than on the influence of impure air in the production of the disease, and the very frequent presence of the rubeoloid exanthema in those affected with it. Dr Tweedie, in his interesting observations on the Influence of Impure Air on the generation of Typhus, refers to the opinion of Sir John Pringle, who states, "that he has observed the hospitals of an army, not only when crowded with sick, but at any time when the air is confined, and especially in hot weather, produce fever of a peculiar kind, which is often mortal; and he remarked, that the same thing arose in full and crowded barracks, and in transport ships, when filled beyond a due number, and detained long by contrary winds, or when the men had been long kept at sea under close hatches in stormy weather." He also refers to the experience of Mr Pearson, who, he says, "told me, that when he was surgeon of the Lock Hospital, he uniformly observed, when more than a certain number of patients were placed in any of the wards, fever became prevalent in the establishment; and that, from repeated observation of this fact, he was induced to restrict the number of beds in each ward, and never afterwards witnessed the recurrence of fever in the house." It appears to me that the instance cited by Dr Roupell, (at p. 54 of his work,) of fever coming on, in the Refuge, open in 1830–31, on the north side of the Thames, at a time when the wards were crowded to excess, might alone suffice to cast strong doubts on the correctness of his opinion.

If we consult the details given from p. 7 to p. 42 of Gauthier de Claubry's elaborate treatise, of various epidemics of typhus, described by such men as Pringle, Roux, Hufeland, Ducastaing, Reveillé Parise, Tresat, Tort, Gilles de la Tourette, Laurent, Ardy, Magnin, &c. and his summary from p. 100 to p. 114, we find the unanimous voice referring the generation of the disease to vitiated air, arising from the crowded state of the hospitals, the carnage among troops and inhabitants, and the want of burial; the scarcity of provisions, depressing passions, exposure to cold and fatigue are likewise more or less frequently mentioned; but we are entitled to regard these as merely accessary; for we have already seen the developement of typhus where these conditions were wanting. Montault, from an extensive induction of facts, likewise comes to the same conclusion; Copland,* expressly points out the influence of the circumstance in question, in producing "highly infectious and typhoid forms of fever."

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* Art. "Infection," p. 352.

How, indeed, is it possible, except on this supposition, to explain the appearance of typhus in a country, and in the midst of armies, perfectly healthy, till the developement of the conditions in question, but which, under their influence, were desolated by a pestilence, whose ravages, more frightful than those of war, consigned many, whom the sword had spared, to "an ever-yawning and never-satisfied grave?" We cannot, in order to account for this, admit the idea, that, by some strange and inexplicable principle of election, infectious miasmata direct their course from distant shores to the seat of war, especially when we see in their invariable antecedence and sequence, the relation of cause and effect so clearly made out between the conditions referred to, and the appearance of the disease. What reasonable cause can be assigned for the murderous epidemic that arose, in the spring of 1810, on board the Plymouth prison-ships, and cannot be referred to contagion or infection, as the disease first declared itself among the prisoners confined in what have been well termed "these floating tombs," if not the very natural one of the long continued confinement of hundreds of persons, in a situation uniting all the conditions most adverse to health? These considerations are borne out by the undisputed fact, that the type of fever becomes much more malignant in hospitals crowded to excess, and by Gauthier de Claubry's curious statements at p. 148 of his work, where, speaking of the treatment of typhus, he mentions that, during "the wars of the empire," patients previously despaired of, notwithstanding the assiduous use of therapeutic agents, were quickly restored to health, on the evacuation of the hospitals, with fresh air, barley-water and lemonade. How completely does this agree with the experiments of Pringle, as quoted above. Let me further refer to a paper by Dr Peebles, in the fourty-fourth volume, (No. 125) of the Edin. Med. and Surg. Journal, as detailing the results of his own experience in Italy, and giving a remarkably clear, succinct, and comprehensive digest of the mass of evidence bearing on this interesting subject. Dr Alison's statements in his recent phamplet on the Scottish Poor Laws fully confirm the general opinion. I have only to add, in again partly anticipating details, to which I shall presently advert, that 22 of 30 patients who positively declared to me that they had not in any way been exposed to infection, replied as follows to my inquiries respecting the number who lived together. In three cases there were 4; in seven 5; in two 6; in three, 7; in two 8; in one 9; in one 10; in one 12; in one 13. Many of those, who traced their affection clearly to contagion, stated the number of those who lived together as 12 and 13, and in one or two instances, as "16 at least." This, be it recollected, in one, or at most two small rooms, in the most miserable, darkest, and worst aired purlieus of a large manufacturing city. After the facts I have adduced, I think we may safely conclude, that "animal effluvia," to use the term of Dr

Copland, or " emanations from living bodies in close and unventilated situations," possess the property of generating the specific poison, whatever be its nature, that gives rise to exanthematic typhus.

With regard to the producing cause of typhoid fever, all is vague and uncertain. Chomel, after his analysis of the causes assigned by patients, remarks, (p. 306), " Thus, scarcely, out of a number of patients so considerable, (115), is there one in four who attributes his state to some slightly energetic cause." But what chiefly concerns us to know is, whether the conditions we have seen to be so powerful in the production of typhus are the same, or anything like the same, in regard to typhoid fever. Exactly on this point, Louis remarks,* " No more can the dwelling in places, low, and inhabited during night by too great a number of individuals, figure among the causes in question, one-eighteenth only of the patients being in that condition ;" and he concludes, from a comparison of all the commonly assigned causes with the facts ascertained by himself, in these remarkable words ; " The deepest darkness then prevails regarding the causes of the affection under consideration." Chomel likewise (p. 300) uses almost the same words in beginning his third article, " The causes of typhoid fever are wrapt in the greatest obscurity." It were difficult to find a more striking instance of the little effect of the circumstances we have mentioned, in producing typhoid fever, than the epidemic at Bischofsheim, in the department of the Lower Rhine, in August, September, and October 1832, described by Ruef in the Gazette Medicale for 1834, and referred to by Gauthier de Claubry, who maintains the identity of that disease and typhus. (P. 133, et seq. of his essay.) The disease first showed itself, without suspicion of being transmitted, in the upper, best aired, and, as is expressly said, " the most healthy part of the village," which is situated partly on and partly at the foot of a rising ground, and spread successively to the middle and lower quarters. Again, the result of Lombard's researches, conducted at Geneva throughout several successive years, is, that the cases of typhoid fever are numerous during the autumn, and comparatively few during the winter months ; whereas the ravages of typhus, as every one knows, are most formidable during winter.

II. I come now to consider the proximate causes of the two diseases. To avoid all ambiguity in the use of the terms, infection and contagion, which have caused, perhaps, a greater war of words than any two terms in any science, I shall merely state, that with Dr Copland, I take infection in its classical sense, and understand by it the imparting of any taint, pollution, or contamination whatsoever, to a person previously in health. By contagion, I understand a mode of infection, viz. infection by contact. As applied to the subject of fevers, it will at once be seen that infection has not merely a reference to disease, but to miasmata, or specific poisons, independent of disease, to the contaminating agent, as well as the individual contaminated, and communicating disease. In this point of view, the question is set at rest by the remarks offered under the first head. Hence, we consider typhus as a truly and eminently infectious disease. The same, we have seen, cannot be said of typhoid fever. The question, then, we have now to consider, reduces itself into one of transmission or propagation from a diseased to a healthy person. The difference, in this point of view, between infection and contagion is one of degree, and not of kind; and there are cases of morbid impression, which it would be very difficult, if not impossible, to refer either to the one or to the other, so imperceptibly do they glide into each other. It is natural, however, to conclude that, as the genus includes the species, so a disease that is first produced by the action of a specific infectious agent on the animal economy, must be directly transmissible from a person diseased to a person in health. To argue at any length in favour of the transmission of typhus, whether through the medium of the atmosphere, or by the direct inhalation of the morbific matter from a person labouring under its effects, would be a waste of time. It is admitted all but universally. The fearful rapidity with which it extends its ravages; the great number of cases in which patients refer their complaint to living with, or attending others affected with it; the all but universal occurrence of the disease in nurses and resident medical attendants, put beyond a doubt the communication of the disease. Lassis, shortly after publishing his ingenious work, Recherches sur les Veritables Causes de Typhus, ou de la Non-contagion des Maladies Typhoides, fell a victim to the contagion, the existence of which he denied. Need I further refer for the proof of this position to the names of Sydenham, Morton, Pringle, Huxham, Hildenbrand, Chomel, Tweedie, Roupell, Gauthier de Claubry, Montault, Lombard, indeed to almost all the writers on the subject? The facts stated by Tweedie, from p. 85 to p. 99 of his treatise, by Gauthier de Claubry, (p. 100 to 114), and by Dr West in his able paper on Exanthematic Typhus, in the fiftieth volume of the Edinburgh Medical and Surgical Journal, are conclusive as to the communication of typhus to medical attendants, nurses, and patients labouring under other complaints, and they are completely borne out by my own experience. It is well known, that, for many years past, every resident clerk in the Glasgow Infirmary, with very rare exceptions, many students who frequented the fever wards, several of the acting physicians, and almost all the nurses, have, at one time or other, been attacked with typhus, and that not a few have fallen victims; and Dr Cowan, under whom I had for a long period the honour of serving, in his pamphlet, entitled Statistics of Fever and Small-pox in Glasgow, says, (p. 10), of the district surgeons, " Few of those gentlemen escape an attack of fever." Dr West's statements as to the spread of the disease among patients admitted for other complaints to St Bartholomew's, but placed in the same wards with others affected with typhus, and the necessity of at length closing the ward, show the groundlessness of the objection that contagion arises merely from concentration. During the winter of 1837-38, an isolated case of typhus in one of the medical wards of Glasgow Infirmary, communicated the disease to most of those in the same ward, and several died. The following are the results I obtained from the statements of 139 patients, whose cases I investigated with particular care in the years 1837-38. Much more extensive researches subsequently made by Dr Anderson and myself, the details of which, unfortunately, I have not with me, will, I doubt not, bear out this statement.

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* Vol. ii. p. 457.

	Doubtful or cause unknown.	From infection.		Typhus in family.	In same house.	Contagion.
Males,	21	39	of	27	8	4
Females,	18	61	whom	42	12	7
	39*	100		69	20	11

I have already spoken of the conditions in which 22 of the patients were placed who denied the influence of infection in the production of their complaint. Gauthier de Claubry remarks, (p. 113,) that it requires " some degree of medical courage" to uphold the propagation and perpetuation of typhus by specific infectious germs, according to Hildenbrand. On the supposition of its identity with typhus fever, this may be so; the difficulty vanishes on supposing them different.

What is the state of the case in typhoid fever? It is well known, and stated both by Chomel and Gauthier de Claubry, that the all but universal opinion in France is against its being infectious. Louis does not even mention it; Andral (p. 728, English edition,) gives his verdict against it; Montault (pp. 12 and 186,) recapitulates the arguments against it. On the other hand, MM. Bretonneau, Gendron, Chomel, Lombard, and Gauthier de Claubry, maintain, more or less decidedly, the contagious nature of the disease. It is rather amusing that the last named author, while arguing for the contagion of typhoid fever, in order to prove its identity with typhus, adduces the contagion of the latter in the English hospitals, in support of his position, while Montault, holding the difference of the two affections, feels constrained, in order to get over an imaginary difficulty, to express a doubt (p. 12,) as to the cleanness and salubrity of the British, as compared with the French hospitals, and to assert that "the English physicians are not perfectly acquainted with the anatomical alteration of typhoid fever;" while Gauthier de Claubry, in order to get over the real difficulty arising from the absence of anatomical lesions in the Glasgow and Edinburgh typhus, speaks of the "serious circumstances of misery and exhaustion of strength, which have so deplorably modified the constitution of the inhabitants of these wretched countries, Scotland and Ireland." Those who know the admirable cleanness and ventilation of our fever hospitals, and the acquaintance of our medical men with the lesions referred to, will readily dispense with any serious refutation of such gratuitous suppositions; and the too sweeping assertion of Gauthier de Claubry, as we shall afterwards see, (though partially borne out by the recent statements of Dr Alison, regarding the condition of the lower classes in the large cities of Scotland,) even were it admitted in its fullest extent, proves nothing in his favour. Chomel's third conclusion (p. 339,) is, that, if the identity of the anatomical lesions in the two diseases were proved, the question of contagion would be set at rest. We shall see hereafter what is the testimony of facts in regard to the lesions in typhus. Meantime, let us consider the facts in reference to contagion.

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* Of these 39, there were 30 who positively denied contagion, 6 are not marked, and 3 were doubtful.

Louis, I have mentioned, does not allude to the subject. From this we might conclude, that he had found no facts in support of the theory of contagion, for we can scarcely suppose that an observer so scrupulously accurate would neglect so important a branch of his subject; but we prefer an appeal to positive facts. Chomel, we have already seen, states how very few patients ascribed their illness to any energetic cause. Five only out of 115 were placed "in circumstances favourable to contagion," 79 could "assign no appreciable cause," (p. 306.) In accordance with this I may state, that in no case, though questioned with the greatest care, either in Scotland or in the hospitals of Paris, have I ever found the disease referred to contagion. On the other hand, it appears from the statements regarding the epidemics of Nancy by Leuret, of Chateau de Loire by Gendron, of Andlau and Stolzheim by Mistler, of Bischofsheim by Ruef, and those contained in Bretonneau's memoirs; (commented on by Gauthier de Claubry, from p. 118 to 135,) and from the clear statements borne out by dissections of Lombard, (in his valuable paper upon the Geneva epidemic of 1835, inserted in the Gazette Medicale,) seem to prove the possible transmission of typhoid fever, when epidemic. Without hazarding any decided conclusion on a point still so keenly debated, I would simply direct attention to the differences as regards the probable origin and propagation of the two diseases, which the foregoing facts appear to establish ; and also to the interesting question, whether, if typhoid fever really depends on, and is propagated by a specific poison, that poison is, or is not generated in the same circumstances as the infection of typhus ?

III. There are circumstances connected with the course of the two diseases well worthy of attention. The fact, as undoubted as it is remarkable, that the mean duration of typhus is about one-half that of typhoid fever, is one that perplexes considerably the advocates of their identity. Chomel argues (p. 337,) that it only shows a difference of intensity. Gauthier de Claubry, who very judiciously does not venture to face the statistical details on the subject, and treats of it only under the head of the relative intensity of the two diseases, meets the objections on the same ground as Chomel. I have already remarked the extraordinary difference of the duration in the Glasgow epidemic of 1836. Hildenbrand states the mean duration of typhus at about 22 days, and that of the Glasgow typhus, from the results of many thousand cases, during successive years, approaches very nearly to this result, being about 21 days. An analysis of my own cases gives me a mean duration of 20.82 days, or deducting three cases, one of which terminated fatally from phthisis on the 42d, another not convalescent from consecutive paralysis on the 60th, and a third restored to health about the 100th day, after severe attacks of glossitis, pleuro-pneumonia, and a variety of other complaints, 19.6 days. Valleix, in his third memoir on Typhus and Typhoid Fever,* states the mean duration of six cases of the former, and seven of the latter, (observed in London by Dr Shattuck of Boston,) as respectively $24\frac{1}{2}$ and $22\frac{1}{5}$ days. To account for this discrepancy with the unanimous voice of other authors, it is enough to refer to the small number of cases, and to state that the cases of typhus were of great severity, (five out of six having died,) while those of typhoid fever were very mild, and only one in seven terminated fatally. It appears, on the other hand, from Chomel, (p. 44,) that three-fourths of the cases cured began to show signs of amendment, only between the 15th and 30th, and 18th of the whole number only between the 31st and 40th days. Louis again, (Vol. i. p. 9, 13,)mentions the duration in cases of death to be from eight to beyond 40 days ; in serious cases which were cured, from 15 to beyond 50; or on an average 32 days ; while that of the light cases was 28 or 29 days. Montault (p. 22,) states, that of 63 cases observed by him, the mean duration was 36 days. The mean duration of nine cases of all different shades of intensity, very carefully watched by myself, chiefly in the wards of M. Chomel in the Hotel Dieu, is 38.7 days. One of these, admitted on the 13th of last December, has not yet terminated. I take the duration of the fever from his first convalescence, (on the 75th day,) after which he had a relapse without any marked local affection, and his recovery is very doubtful. M. Chomel in his summary on the 22d of last March, of all the fever cases (25 in number,) that had occurred during the previous six months, stated

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* Arch. de Medecine, 3me série, T. vi. p. 135—138.

The mean duration of the very serious cases as - 31 days.
those of moderate intensity, as 18
the lightest cases, as - 10

giving an average for the whole number of 19.6 days. He, however, called particular attention to the fact, that the cases were much less numerous, and the affection greatly milder, and much less fatal than usual, the mortality, commonly 1 in 3 or 4, being only 1 in 12.6.

Being firmly persuaded that the remarkable length of typhoid fever often depends upon conditions not commonly adverted to, I beg the reader's indulgence while I go into some details on the subject. What I wish to establish is, that typhus, when uncomplicated with any secondary affection, terminates in convalescence or death in the course of a single attack; in other words, that a second attack of typhus does not occur in the course of one and the same illness. On the other hand, it shall be my object to prove that such is not the case with typhoid fever.

With respect to typhus, I allege generally, notwithstanding the high authority of Dr Copland, who maintains directly the contrary,* that, (apart from secondary complications, which often completely change the course and termination of the disease,) however long may be the period of excitement,—however long the adynamic stage,—however tedious the period of convalescence, I have never, among thousands of cases, seen a single case of relapse, in the proper sense of the term, after the symptoms had begun to decline. Is this objected to as vague? I appeal to the following facts. Of 139 cases, examined during the course of the disease with great minuteness, I find that 119 presented no secondary complications. Of these 20 died at the height of the fever, the symptoms having presented a constantly increasing intensity till the fatal termination. The remaining 99 offered, without a single exception, a steady aggravation of all the symptoms till a certain period, (more or less distant, according to circumstances, from the beginning of the disease,) after which they exhibited as steady a decline. The remaining 19 were complicated in varying proportions with phthisis, pneumonia, chronic bronchitis, hemiplegia, erysipelas, bed-sores, diarrhœa, &c. to one or other of which diseases four fell victims, the secondary affection generally declaring itself after a temporary amendment.

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* Dictionary, p. 1012, Art. "Typhus Fever."

Let us now inquire into the state of the case in typhoid fever. I find Montault, (p. 18,) when treating of convalescence, remarking, that " relapses are easy" in that period. Louis,* speaking of the same period, uses these words: " Yet several of them (the healthy functions) were re-established very slowly in several individuals, and convalescence was thereby retarded. The heat was more or less great; the pulse continued more or less quick; the diarrhœa persisted, though it could not always be referred to imprudences in diet." This is all I have been able to find in the various authors I have consulted. I shall now cite several cases in point.

On the 26th of February 1838, a young man, 17 years of age, was admitted to the wards of the Glasgow Fever Hospital. He had been ten days ill with most of the symptoms of follicular enteritis. On admission he had a few rosy spots on the belly, very red and papillated tongue and fauces, circumscribed flushing of cheeks, disturbed sleep, tickling cough, extensive bronchitis, dull pain, tumefaction, and gurgling sound in the belly, with moderate diarrhœa. He had epistaxis on the 12th, 18th, 19th, and 23d days of the disease, and on one occasion to the extent of one or two pounds. The eruption became pretty copious, then declined, and on the 30th day disappeared. At that time the pulse, which had ranged between 104 and 90, fell to 80 and 76; the bronchitis all but disappeared; the tongue, which had been excessively red, chopped, and aphthous, became smooth and less florid; the gurgling noise less; and the appetite good. On the 20th March, (the 32d day,) he had rigors, continued on the 21st with rise of pulse to 104, and followed on the 23d by pretty copious eruption on breast and back, by return of thirst, clamminess of tongue, loss of appetite, sibilant wheeze in chest, renewed tenderness of belly, frequent bilious vomiting, continued for five days, and epistaxis for six days running. The symptoms followed their regular course, and the eruption had nearly disappeared, when, on the 4th of April (47th day), a fresh, elevated, lenticular eruption appeared on the chest and epigastrium. The only altered indication after the appearance of this eruption was a temporary rise of pulse from 92 to 104. On the 11th of April, (54th day,) he was dismissed by his own desire; and I heard some time afterwards that he had rapidly convalesced after his removal.

The phenomena observed in this case scarcely require any comment; and I therefore proceed to detail others that have fallen under my notice.

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* Vol. ii. p. 11.

On the 9th of last December, a young woman, aged 22, entered M. Chomel's female ward, the Salle St Augustin, with symptoms of typhoid fever of ten days standing. The affection was mild, the eruption abundant, the intelligence good. Amendment soon took place. The countenance, previously very languid, became more lively, the pulse sunk to 92, and she seemed rapidly convalescing, when, on the 24th of December, (25th day,)—as I learn from the reports furnished me by my friend M. Gueneau de Mussy, to whose experience and kindness I am much indebted—the pulse rose to 108. There were marked and sudden prostration, pain, and crepitant rattle in the right subscapular region; deafness, which had been considerable, became complete; stupor and involuntary discharges came on after some days, and death followed on the 28th of December. Inspection disclosed the following appearances. Incomplete splenisation of lower part of right lung; diseased aggregate glands at the lower part of the ileum, some ulcerated, some going on towards cicatrization, others not ulcerated, and in the state in which they are described about the sixth day of the disease. Who can ascribe the supervention of such serious symptoms as those I have sketched to the inflammation of a small portion of the lower lobe of the right lung? Is it not much more rational to refer them, and to ascribe the morbid appearances, as M. Chomel did in his lecture on this case, to a fresh intestinal eruption of a few days standing.

Again, on the 27th of last February, a young man, aged 21, entered the Salle St Louis in the Hôtel Dieu, on the eighth day of typhoid fever. The eruption appeared next day, became pretty copious, and on the 13th of March, (the 23d day of the fever,) it is reported as all but gone. All the symptoms had diminished greatly in intensity. The pulse had fallen to 76. Convalescence took place. He was eating and relished the half-diet of the hospital, when, on the afternoon of the 31st, the pulse, in the morning 90, rose to 136. Violent diarrhœa came on. The pain of belly, formerly slight, became considerable, and a pretty copious eruption of well-marked "typhoid spots" appeared. The chest, minutely examined, presented nothing unusual. On low diet the symptoms declined; and I find him marked in my notes convalescent on the 4th of April. He is about to leave the Hôtel Dieu.

I refer further to a case detailed at p. 30 of the first volume of Louis's work. The patient had been three weeks ill. During the first fortnight the ordinary symptoms, it seems, were observed; more particularly headach, relieved by epistaxis, during the first week; then gradually increasing diarrhœa and pain of belly.

In the third week renewal of rigors and heat of skin. Appearance of the eruption and recurrence of epistaxis is on the 23d day. These phenomena were followed by violent delirium, terminating in partial stupor, and death on the 26th day. On dissection solitary glands, not ulcerated, in the upper; both solitary and aggregate glands ulcerated in the lower part of the small intestine; "a great number of small tumours flattened, not ulcerated," in the large intestines. Do not the symptoms fully bear out the opinion, that the formation of the tumours described by Louis was coincident with the aggravation of symptoms in the third week, and that the extensive ulceration at the foot of the ileum was the result of disease of much longer standing? The invaluable researches made of late years into the pathological anatomy of this affection by Bretonneau, Petit, and Serres, Andral, Louis, and Chomel, would necessarily lead to this conclusion. And, in point of fact, Louis says, (p. 37,) that they were "most probably developed at the same time as those in the first half of the small intestines, being, like them, not ulcerated." Now, according to the generally received theory, the glands in the upper half of the small intestine are developed at an advanced period of the disease.

I conclude my remarks on this head with a reference to Chomel's work. At p. 361 is the case of a patient, admitted on the eighth day of the disease. Prostration, nausea, some epigastric pain, slight diarrhœa, "a few rosy spots," were the leading symptoms. They quickly yielded; the diarrhœa had almost ceased, and a great amelioration had taken place, when, on the twenty-third day, all the symptoms returned, in a much graver form, accompanied by stupor, violent diarrhœa, "inclination to vomit, (it is expressly said), *like that* at the beginning of the disease;"—"slightly marked" improvement on the twenty-seventh and twenty-eighth days; recurrence of same symptoms, with delirium and erysipelas, on the thirtieth day; extension of erysipelas to whole right side of face and neck, and also to scalp. Almost every trace of it had disappeared on the thirty-fourth day, when epistaxis and stupor, approaching to coma, were observed. Death ensued on the thirty-fifth day. Dissection disclosed *a lobule* of gray hepatization in one of the lungs. In the upper part of the ileum, "patches partially ulcerated;" in the last 15 inches, numerous ulcerations of very small extent, and which appear to depend on the alteration of the isolated follicles; besides, that a great number of the last-named glands present an abnormal volume, without ulceration," (p. 364.)

The symptoms mentioned as recurring on the twenty-third day, after the almost complete cessation of the diarrhoea and other unfavourable signs, cannot certainly be accounted for by the "lobule of gray hepatization," found after death, nor by the erysipelas, which did not come on for seven days afterwards, and was then ushered in by a new exacerbation, after a second decline of all the symptoms. In fact, we have there all the phenomena of a fresh attack on the twenty-third day, followed on the thirtieth by erysipelas as a *sequela*. Am I not warranted, then, in concluding, that the exacerbation observed at the former date was accompanied by a fresh eruption of isolated follicles? This is strongly supported by another *post mortem* appearance observed, viz. the uniform rosy tint of the whole of that portion of the small gut that lay in the lower pelvis.

After the facts that have been adduced, I feel almost entitled to expect assent to the likelihood of the opinion, which, I am convinced, future observation will confirm, that in *typhus*, when uncomplicated with any secondary affection, a second attack does not take place, while in *typhoid* fever the contrary is the case.

I have a few more remarks to offer upon the duration of typhus. There are cases which are said to run their course in a few days. I do not speak of the *typhus siderans* of Saragossa, Torgau, and Mayence—a disease that was often mortal in a few hours. It is not to these cases of frightful intensity that I allude, though I may remark with Montault, that the earliest death recorded in typhoid fever is, I believe, that of a patient of M. Bretonneau, on the fifth day. The cases I refer to are those in which a cure is said to take place on the seventh or eighth day, or even earlier. Many authors of distinguished eminence detail cases wherein certain modes of treatment, early applied, have cut short, as the phrase is, attacks of continued fever. In short, it has been often laid down, that an early bleeding, an emetic, a strong purgative, can crush the hydra in the birth, and restore the patient to health. Dr Henderson in his part of the Report on the Epidemic Fever of Edinburgh,* states expressly, "If the presence of maculæ, red spots, or typhoid eruption, be considered as conclusive of the nature of the disease, though not necessarily a symptom in all cases of continued fever, then I can have no hesitation in deciding that this fever may run its course in a few days; for instances of convalescence have occurred to me on the seventh and eighth days, in which the eruption had existed, without which the diagnosis would have been perplexed, as in other cases."

Without denying the possibility of the above, I remark, that it would have been desirable to know, whether, in the cases spoken of, very minute inquiries were instituted respecting the exact days on which the patients were first attacked;—for every one knows that the premonitory period of languor and uneasiness, extending often over a week, or even more, is seldom taken into account by patients in describing their complaints. But I object to the general position on other grounds. It is matter of notoriety, that very many cases of catarrh at all seasons, of influenza when it is epidemic, and of bilious affections during the heat of summer, are sent to the fever hospitals, because they simulate, in a most remarkable degree, the symptoms of commencing typhus. So it was in Glasgow Fever Hospital. These cases yielded in a few days to the exhibition of one or other of the above-mentioned remedies, while the same means were used, apparently without any effect, either as regarded their duration or intensity, in very many cases of genuine typhus. So firm is the belief in Glasgow, that those which terminate in a few days are not cases of continued fever, that they are not permitted to go into the convalescent wards, where sad experience has shown the much greater contagiousness of the disease. In fact, (and this militates strongly against Hildenbrand's opinion, that typhus is most contagious during the "nervous stage," beginning to be so when the eruption appears,) scarcely one of the hundreds dismissed from the *acute* wards ever returned labouring under typhus, though they had remained for a week or ten days in wards sometimes crowded to excess; while, of the few who, by mistake, went into the *convalescent* wards, scarcely one escaped the disease, and several died. No patient who presented the eruption was ever known to contract the disease anew, even among the convalescent patients.

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* Edinburgh Medical and Surgical Journal, No. 141.

I cannot omit to notice another circumstance connected with the course of the two diseases, which appears to me one of considerable interest; I mean the occurrence of *crises.* I do not refer, by this expression, to the dark and debated question of *critical evacuations*, nor will I institute any inquiry as to whether certain discharges, on certain days, are or are not attended with an improvement in the general symptoms. All that I insist upon is the frequent, I may say, the common occurrence of a perceptible crisis, or what is vulgarly termed a turn in typhus. I think I may appeal to the experience of every physician, and more especially of every resident clerk in a fever hospital, (for they have more constant opportunities of observation,) whether they have not often been struck at seeing, during their morning visit, the glassy eye, the haggard features, the low muttering delirium, the stupor approaching to coma, the tremor, the subsultus, the carphology, the rapid, thready, tremulous, and intermittent pulse, of the previous evening, the formidable array of symptoms, in short, which seemed to indicate a speedy and fatal termination, exchanged for the clear eye, the intelligent countenance, the steady hand, the comparatively slow and firm pulse, and the returning appetite of approaching convalescence. To such cases as these we might almost apply the scripture phrase, "At such an *hour*, the fever left him;" and if the crisis is not *very* frequently so marked, we can, in the great majority of cases, point with precision at least, to the *day* on which amendment began to take place. In reply to the question whether this is the case in typhoid fever, I can only adduce my own experience, when I state, that neither in the numerous cases I saw in Scotland, nor in those I have watched in Paris, (about a dozen of them very carefully,) have I ever seen anything approaching, in the remotest degree, to what I have noticed so frequently in typhus.

IV.—I proceed to a fourth and very important branch of my subject, viz. the consideration of symptoms. I shall not be tempted, by the highly ingenious and visionary conclusions drawn by Valleix, from his six cases of typhus,* to make any lengthened digression. That author actually considers the absence of headach and affections of the organs of sense as important diagnostic marks of typhus. Instead of wearying the reader with the laboured refutation I had prepared of this strange fancy, I shall merely state, regarding my own cases, that, excluding those in whom the headach ceased before the 5th day, it was present after that period in 98. In between one-sixth and one-seventh of this number it ceased before the 10th day; in the remaining five-sixths it continued throughout the advanced stages of the disease, being present in many till the 20th and 25th days; and in 11 throughout the whole course of the affection. Hearing, again, was either more acute, or perverted, or impaired in 69 patients. And finally, while I refer to the almost unanimous testimony of the multitude of distinguished authors cited by Gauthier de Claubry in pp. 5 and 39 of his work, I find recorded in my notes, as among the most constant symptoms, excessive intolerance of light, (of which I can add my own experience); suffusion of the eyes to an extent rarely if ever witnessed in typhoid fever; and minute injection of the conjunctival vessels. In not a few cases chemosis, corneitis producing ulceration and onyx, iritis, and in two or three cases Egyptian ophthalmia, occurred in the course of the disease. What, again, are more common in typhus than the glassy eye, (considered by Rochoux peculiar to it, from its very rare occurrence in typhoid fever,) the immensely dilated and extremely contracted pupil, and even total blindness? If reminded that, in adducing those facts, I am proving the identity of the two diseases, I reply, that if to prove the existence of analogies is to prove identity, there is an end to all conclusive reasoning and accurate knowledge. In order to establish from analogy the identity of any two diseases, the resemblances must be so numerous, so striking, and, above all, so important, and the differences so few, so trifling, and so easily accounted for, as to warrant the overlooking of the latter conditions, which have certainly not as yet been answered in the case before us.

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* Arch. de Med. 3me Serie, T. vi.

1. I have now to consider symptoms that have a material bearing on the decision of this important question. The state of the abdomen and bowels during life is naturally regarded as worthy of particular attention. The common use of purgatives in Great Britain throughout the course of typhus, and their well-known beneficial effects, while they render the declaration of Montault, (p. 93,) that Hamilton's method " still converts some partisans in England," not a little amusing and " passing strange," the sweeping condemnation pronounced against their repeated administration by Gauthier de Claubry, (p. 156–172,) prove at the same time the existence of certain symptoms to be combated. Though not called upon here to undertake a defence of the English mode of practice as applicable in all cases of typhus, I refer to it as furnishing some very remarkable facts bearing on the question at issue. Dr West, in his able paper on Exanthematic Typhus, (in the fiftieth volume of the Edin. Med. and Surg. Journal,) makes the following observations:—" The action of the bowels was not disturbed in the great majority of cases; in fact, the administration of mild laxatives was necessary, in most instances, in order to obtain an evacuation, once in 48 hours; and in some of the most severe cases the bowels were very constipated. Diarrhœa occurred only in ten of these sixty cases; in three of which the patients died, and it was only four times that it lasted for longer than 48 or 60 hours. * * * In thirteen cases the bowels were constipated. The following is an abstract of the statements of Dr Henderson in regard to the state of the bowels in 154 cases of typhus.

	Males.	Females.	Total.
Bowels easy in	26	73	99
loose in	—	5	5
costive in	19	31	60
	45	109	154

In reference to the following results obtained by myself, I have only to remark, that in many of those cases in which diarrhœa is described as spontaneous, the requisite information was unfortunately not got as to the previous administration of purgatives.

		Males.	Females.	Total.
Diarrhœa	**Spontaneous in**	13	10	23
	From medicine in	26	27	53
	Doubtful in	1	—	1
		40	37	77
Costiveness notwithstanding the exhibition of purgatives,		20	42	62
		60	79	139

Thus, according to Dr West's observations, the bowels were constipated in nearly one-fourth; in Dr Henderson's in about one-third; in my own in between one-half and one-third of the cases. Again, spontaneous diarrhœa occurred in one-sixth of Dr West's; in only one-thirtieth of Dr Henderson's, or, adding three, in which it came on very late in the disease, and might be referred to secondary affections, in one-nineteenth; and in nearly one-sixth of my own cases.

How different is the state of matters in regard to typhoid fever? Chomel (pp. 6, 10,) mentions diarrhœa as a symptom scarcely ever wanting, and states it as occurring (p. 230,) in 40 out of the 42 fatal cases recorded by him. In the still more precise observations of Louis, we find it awanting in only 3 of 128 cases, and in 58 of these it was contemporaneous with the commencement of the affection. Spontaneous diarrhœa was present in every one of the 9 cases observed by myself; in 3, it was one of the first symptoms, having declared itself on the first day, along with the general premonitory symptoms. In one, it began on the 4th; in another, on the 6th; in two more, on the 10th; in an eighth, on the 11th; in the ninth, it was observed after a few days illness, the precise day not being specified. This symptom was present, in one case, from the 1st till the 22d day, recurred on the 36th and continued, during a second attack, till the 46th day. Its shortest and longest durations were respectively 10 and 43 days; and its mean duration above 22 days.

As to its characters, in two it was very violent, and opium had little effect in checking it. In two, it occurred in severe attacks, which assumed a periodic character; and in the rest it was moderate but always or nearly always present. Without insisting further on the comparative duration of the diarrhœa in the two diseases, though it would, if minutely investigated, bring out still more clearly the extraordinary contrast already presented,—I proceed to the consideration of the state of the abdomen in the two complaints. This I propose to do under two heads, relating, *first*, to the feelings of the patient, and *second*, to the sensations of the medical attendant.

2. In thirty out of the sixty cases observed by Dr West, there was pain in the abdomen, but in only nine was it severe. Dr Henderson remarked it in 46 out of 198, and never in the right iliac fossa. The following are the results of my own observation;

Abdomen painful in 109 out of 139 patients.

	Males.	Females.	Total.
Pain intense, or at least severe in,	17	27	44
slight, . .	24	41	65
	41	68	109

The duration of the abdominal pain was as follows:

	Males.	Females.	Total.
Throughout the disease, in	18	27	45
a considerable part of it, in	6	9	15
From two to six days, in	12	24	36
One day only,	5	8	13
	41	68	109

Deducting the thirteen, in whom this symptom was present only one day, and in whom it may fairly be attributed to some accidental cause, we have 96 cases out of 139, in whom abdominal pain was somewhat permanent, and in 60 only did it continue throughout the greater part of the illness. In the great majority, the pain was general,—in 32, it was chiefly or entirely confined to the region of the liver, a circumstance noted by Dr West;—8 of those in whom this was observed had long laboured under chronic hepatitis. In 17 of the 32 alluded to, (between one-half and one-third of those in whom the pain was severe) the liver was exceedingly tender to pressure; and it was the seat of pain more or less acute, in 20 out of the 60 patients, in whom the abdomen was tender during the greater part of the disease. Dr West mentions the usual duration of the abdominal pain as "about four days, though once it continued for fifteen days, and in three other instances from six to eight days." In 11 only of my own cases was pain observed in the right iliac region, eight of these presenting it during one day, two during two days, and only one for three days consecutively. Valleix notices the presence of diffuse pain on pressure, for three or four days, in two of six typhus patients; and of pain on pressure and constant uneasiness in four, and of colic in a fifth of the sixth labouring under typhoid fever.

According to Louis, abdominal pain was present in 112 cases only of 128, was rarely general, occupied in the vast majority either in the iliac fossæ or the hypogastric region, continued generally throughout the greater part of the disease, its duration being commonly from 10 to 25 days. In six cases it lasted a whole month. The results of my own observation are, that abdominal pain was present in every case examined by me; and that in six, in whom pain was observed during their residence in the hospital, it was either confined to the ileo-cæcal fossa, or more severe there than elsewhere, having been diffused over the belly in three of them during a part of their disease. It begun in four on the 1st, in one on the 6th, in one on the 10th, in one on the 14th day of the fever. In the remaining two, it was present, in a decided degree, on their admission to the hospital, on the 11th and 13th days, and had most likely been present for some time before, though not felt by the patient.

This leads me to observe that the leading diagnostic symptoms in the Glasgow epidemic of 1836 were, the red, chopped, and papillar tongue, the dull, circumscribed abdominal pain existing for weeks together, along with constant diarrhœa, harsh skin, and obstinate bronchitis. But what chiefly merits attention is, that while in typhoid fever the pain accompanies diarrhœa, in typhus, the pain is often most severe when the bowels are costive, and is relieved on the exhibition of a purgative, proving its frequent connection with and dependence on a loaded state of the intestinal canal. In typhoid fever, on the other hand, it exists independently of any such condition; a circumstance which, along with its fixed seat, demonstrates its dependence upon local lesion. This is particularly pointed out both by Dr West and Dr Henderson, and it is fully confirmed by my own experience.

To sum up what I have stated on this head; abdominal pain occurred in 186 of 403 cases of typhus, or, deducting those in whom it was altogether transitory, in 173, *i. e.* between one-half and one-third of the whole; while in the 128 cases of Louis, it occurred 112 times, (about five-sixths,) or, adding those detailed by Valleix and myself, in 126 out of 143 cases, *i. e.* in about ten-elevenths of the whole.

3. The next subject that demands attention is the feel of the abdomen. Dr West mentions eleven cases out of sixty, as presenting "some fulness and tympanitic distension;" Dr Henderson, only 8 out of 198. In those observed by myself, I find that the abdomen was

	Males.	Females.	Total.
Highly tumid and tympanitic in .	12	3	15
Slightly so, ...	12	27	39
	24	30	54
Of natural feel, ...	35	50	85
	59	80	139
This symptom lasted throughout the disease in,	9	3	12
During a considerable part of it, in .	3	2	5
From two to six days, . .	7	16	23
One day, ...	5	9	14
	24	30	54

Deducting, again, as I am fairly entitled to do, those cases in which the symptom was very transitory, there remain only 40 in whom it was at all permanent, and in 17 only out of 139 did it continue during the greater part of the affection.

In typhoid fever, on the other hand, Chomel (p. 12,) remarks its almost constant occurrence, and Louis discovered it in 89 of 134 cases, in the great majority of which it lasted during the greater part of the disease. In one only did it disappear in 24 hours. Valleix* remarks its transient existence in one out of six or seven cases of typhus observed in London by Dr Shattuck, whereas it was present at an earlier stage, in a much higher degree, and for a much longer period, (its mean duration being about nine days,) in five out of six patients labouring under typhoid fever. It was remarked in eight of the nine cases examined by myself, and was present from 4 to 34 days, or on an average a little more than 19 days. In the remaining case it was so very slight as to render it doubtful.

Adding together all the cases of typhus above referred to, we find the symptom in question occurring in 74 out of 463 cases, or between one-fifth and one-sixth of the whole. Deducting those in which it was transitory, it occurred in 59 only, or in less than one-seventh of the whole number; whereas it was observed in 102 out of 149, or in rather more than two-thirds of all the cases of typhoid fever—no small difference assuredly.

4. Yet the statements I have made are very far from exhausting the evidence on the subject. I, therefore, proceed to inquire into the relation subsisting between the symptoms spoken of; and *first*, in regard to the coexistence of pain of belly and looseness of bowels in typhus. Of fifty patients in whom pain and diarrhœa existed at one period or other of the fever,

	Males.	Females.	Total.
Diarrhœa was spontaneous in	8	8	17
Diarrhœa was consecutive in	15	18	33
	23	27	50
Pain and constipation were observed in	16	41	57

The numbers in which diarrhœa and constipation were observed were respectively 77 and 62. Therefore had abdominal pain occurred in the same proportion in those who had diarrhœa, as it did in those who had constipation, instead of having 50 only, we should have met with it in 70.8. In other terms, the occurrence in the same cases of pain and diarrhœa is as 1 : 1.54, while that of pain and constipation is as 1 : 1.08.

Remarkable as this difference is, it is in reality much greater. I find from a further and very careful analysis of the cases before me, that abdominal pain and diarrhœa were

	Males.	Fmales.	Total.
Coincident in	14	16	30
Not coincident in	3	4	7
Pain was relieved by supervention of diarrhœa in	4	8	12
	21	28	49

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* Arch. de Medecine, 3me serie, T. vi. p. 142.

Again, abdominal pain and constipation were

	Males.	Females.	Total.
Coincident in -	16	35	51
Not coincident in -	0	6	6
	—	—	—
	16	41	57

Thus, in only 30 out of 77 cases in which diarrhœa, either spontaneous or consecutive, was noticed, did abdominal pain and diarrhœa exist simultaneously; whereas, out of 62 cases in which the bowels were confined, pain in the belly and constipation coexisted in no less than 51. Had the latter proportion been kept up, we should have had 63.3 instead of 30, so that, according to our present data, the coincidence of abdominal pain with constipation in typhus is to its occurrence along with diarrhœa as three is to one. I might still further heighten the contrast, by deducting one who died of phthisis, in whom the abdominal pain did not supervene till after the fever had run its course, and in whom it was found on dissection to depend on very extensive tubercular suppuration and ulceration of the intestines; another in whom it supervened about the 20th day, along with a profuse discharge from a very large bed-sore; and a third, in whom the evacuations, though frequent, were mixed throughout with scybala;—but the difference is striking enough without any such refinement.

I have marked a considerable number of the above as relieved by diarrhœa; a circumstance which naturally provokes inquiry into the previous state of the bowels. I find, then, that of the 30 in whom pain and diarrhœa were contemporaneous, 10 may be called cases of spontaneous diarrhœa, *i. e.* the purging was not, so far as I know, brought on by medicine; while in the remainder it may be ascribed to that cause. In 28 of those in whom diarrhœa, whether spontaneous or consecutive, was observed, the bowels were more or less obstinately constipated during the first stage of the fever; and in that number are included almost all those in whom diarrhœa gave relief to pain. And finally, of the 51 in whom constipation lasting throughout the disease was accompanied by pain, (in many cases exceedingly acute,) the operation of purgative medicine,—of castor-oil, turpentine, jalap, calomel, or the neutral salts, given according to the strength of the patients, and the indications presented in the course of the disease, was followed by decided and immediate relief in 20 cases. Dr West mentions, that of 30 who had pain, eight only had diarrhœa, while 15 were constipated; a result that fully bears out my statements.

Abdominal pain and spontaneous diarrhœa were coincident in all of the nine patients labouring under typhoid fever to whom I have alluded. The shortest period of coexistence was 4, the longest 32, and the average is a little more than 15 days. So constant did Louis find the coexistence of these two symptoms, that (Vol. ii. p. 34, 38,) he considers abdominal pain, both in typhoid fever and other diseases as pathognomonic of an inflamed state of the mucous membrane. In opposition to this I may quote Dr Henderson, who remarks in his report, "In eight, a degree of general tenderness of the abdomen coexisted with tumidity and tension, in only one of which was there diarrhœa."

These statements form the best possible apology for the judicious administration of purgatives in typhus, while the spontaneous supervention of diarrhœa in many whose bowels were confined, demonstrates its propriety beyond the shadow of a doubt, and fully warrants, as it appears to me, a most important conclusion, in proof of which I have adduced the above rather dry and tiresome details, namely, that whereas in typhoid fever there is an early and almost uniform tendency towards looseness of the bowels, there is as constant a tendency in typhus to constipation; that while in the former diarrhœa is a symptom, and a natural, I might almost say a necessary, result of a constant local lesion, it arises in the latter, from the presence of an irritating substance, which it is the object of the *vis medicatrix* to eliminate from the system.

5. I shall offer only a few remarks on the connection between the state of the bowels and the feel of the belly. Of 54 patients in whom, as has been seen, more or less swelling and tympanites, (*meteorismus*,) were observed, 25 had diarrhœa, and 29 were constipated. The following tables will show much more concisely and clearly than I could express it in words, the duration and extent of the tympanites in these two groups of cases.

	Bowels loose.			Bowels bound.		
	Males.	Females.	Total.	Males.	Females.	Total.
Tympanites continued throughout the disease in	6	1	7	3	2	5
Throughout the greater part of it in	1	0	1	1	2	3
From two to six days in	5	4	9	2	12	14
During one day in	4	4	8	2	5	7
	16	9	25	8	21	29

On this table I have only to remark, that 7 of the 25 had spontaneous diarrhœa, but of these seven only two had tension of the belly for more than one day. But, by a careful analysis of the cases, we arrive at still more remarkable conclusions. The following are the results of my investigations;

	Males.	Females.	Total.
Tympanites and diarrhœa coexisted in	12	5	17
Did not coexist in - -	3	2	5
Tympanites was relieved by diarrhœa in	1	2	3
	16	9	25

Tympanites and constipation coexisted in	8	18	26
Did not coexist in - -	0	3	3
	8	21	29

Of the 29, the distension was relieved in 3 by the exhibition of purgatives. The 5 in whom diarrhœa and tympanites did not coexist were constipated at the time the tumefaction was noticed, so that in point of fact distension of the belly was coexistent with diarrhœa in 17, whereas it existed along with constipation in 31. Finally, of the 7 mentioned above as having meteorismus and spontaneous diarrhœa, the two symptoms existed simultaneously only in 4. Dr West, I observe, states,* that of 11 cases in which "there was some fulness and tympanitic distension of the abdomen," diarrhœa was coexistent with it in 7, "while in 3 the bowels were constipated." As to the extent of the tympanites, I find that

	Bowels loose.			Bowels bound.		
	Males.	Females.	Total.	Males.	Females.	Total.
The abdomen was highly tympanitic in	8	0	8	4	3	7
Moderately or slightly so in	8	9	17	4	18	22
	16	9	25	8	21	29

6. In 46 (17 males and 29 females,) out of 54, in whom meteorismus was observed, abdominal pain was also present at one period or other of the complaint, but the two symptoms were coexistent only in 37 patients, in several of whom the pain was so very transient and so slight, in comparison to the duration and extent of the distension, as scarcely to merit notice. To show still further that there is no proportion between the extent of abdominal tension and the pain experienced, I would merely state that, of 15 patients in whom the belly was highly tumid, 6 only felt severe pain; in 5 there was slight tenderness; in 4 none whatever. Of 44, on the other hand, in whom the belly was acutely painful, we have seen that only six presented any remarkable tension; in 18 it was slight; in 20 there was none at all. Dr West's statements are widely different. He states, (loc. cit.) that pain was present in all, except one of those in whom the belly was tympanitic.

I shall conclude my remarks on this head with a few statements regarding the simultaneous occurrence of the above symptoms in my own cases of typhoid fever. Tumefaction of the belly and diarrhœa coexisted in eight patients, from 4 to 30, giving an average of 15¾ days. Tumefaction was unaccompanied by pain in one patient, and lasted from the 12th to the 33d day. In another, abdominal pain was present on admission, but disappeared next day, though the distension persisted throughout. In a third, the abdomen was swollen, but not painful, from the 9th to the 24th, both swollen and painful from the 25th to the 31st day. In the remaining 5, the symptoms coexisted from 4 to 34 days, or on an average about 20½ days.

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* Edinburgh Medical and Surgical Journal, Vol. l. p. 134.

I go on to speak of the eruptions observed in two diseases. This subject has lately begun to excite much interest, more, perhaps, in Great Britain than in France. The proposal which has been made to overturn long-received opinions, and to blot out a long and elaborate section from the nosological dictionary, by placing typhus among the exanthemata, could not fail to awaken a most interesting controversy, and to bring under review the whole history, and much of the symptomatology of typhus. Hildenbrand was the first to propose this innovation. But it was started in England and Scotland by two physicians, who had neither had any communication with that distinguished author, nor with each other, viz. by Dr Roupell, who, it appears from his work, brought the subject under the notice of the London College of Physicians in 1831; and by my friend Dr Peebles, who, on his return to Scotland in 1832, after a long residence in Italy (where he had been struck with the constant occurrence of an eruption in the epidemics of contagious fever,) drew the attention of the profession in Edinburgh to its presence, previously unnoticed, in the typhus of that capital; and after two years of attentive inquiry, published the result of his researches, accompanied with a comprehensive sketch of the history of eruptions in contagious fever, in the forty-fourth volume of the Edinburgh Medical and Surgical Journal,—being the first, as I believe, to submit his sentiments to the medical world. I observe that Dr West, in an able and learned paper in the last number of the same periodical, maintains the opposite opinion. For several reasons, I shall not enter upon this controversy. Besides that the proof of the positions I mean to take up does not require it, it appears to me that we are not yet in possession of data sufficient to demonstrate the truth of the doctrine. That must be the work of many years of patient and very extensive inquiry. I may remark, however, that there is everywhere a growing conviction in its favour, and that, if the claim of typhus to rank among the exanthemata has not yet been fairly made out, its remarkable analogies with that class of diseases are attested, alike by the uniform experience of the past, and the observation of present times. Nor can I consent, without reserve, to conclusions drawn from the alleged absence of eruption; for the fact I have already referred to, (viz. that the eruption in the Edinburgh typhus was unheeded before 1832), shows how appearances may escape the eye of the most distinguished and practised physicians, when their attention is not particularly drawn to them. It is also well-known to many that, previous to a visit which Dr Peebles made to the Glasgow Fever Hospital in the spring of 1835, the exanthema of typhus, then found to be of general occurrence, had neither been looked for nor registered in that institution, and was received as a new discovery. And finally, I must express my conviction, founded on observation, that a very large proportion of those cases mentioned in fever reports, as having no eruption, consists of patients (such as I have already referred to) in whom the disease is only of a few days duration, and does not, for the reasons stated above, seem to merit the name of typhus fever. These considerations, it appears to me, have an important bearing on the decision of this debated question.

While, however, I decline making any further remarks on this branch of inquiry, I must refer shortly, for the practical elucidation of my subject, to the history of the typhous eruption. Much confusion prevails on this point. The meaning of the term *petechiæ* has, in the course of time, undergone a great change. That it was used by the old authors, (loosely enough, doubtless,) to denote what would have been much better called an eruption, is evident from their writings, and has been very clearly shown, by Dr Peebles, five years ago, and by Dr West in the April number of the Edinburgh Journal. Dr Peebles accordingly proposed to retain the old term in its altered but now generally received acceptation, and to consider the rosy eruption as an exanthema. Yet many, from the use of the term petechial by the older writers, persist in denying their acquaintance with the eruption; some, on the other hand, (Rasori, Pinel, Tweedie,) having used the same word in reference to the eruption, are blamed for want of "precision and exactness in the use of terms;" Chomel (p. 336) considers "the true petechiæ or purple spots" to be very much more frequent in typhus than in typhoid fever; Valleix* maintains the eruption to be always dark and persistent, and takes it as synonymous with vibices; while Copland† and Montault (p. 154) describe "ecchymoses and petechiæ as common to typhus and other diseases," and the measly eruption as peculiar to it. Again, Roupell quotes Louis and Chomel in support of his views, as to the true exanthematous character of typhus. One of his reviewers,‡ reasoning on the generally admitted difference of the French and British continued fever, retorts Dr R.'s arguments as proof positive against the truth of his theory, while, with praiseworthy consistency, (p. 103), he cites Chomel's statements regarding the eruption in support of his own opinions.

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* Arch. de Med. 3me Série, T. vi. p. 133-4-6—148-9.

† Dictionary, p. 1010. Art. Typhus.

‡ Med. Chirurg. Review, Vol. xxxi. p. 99.

I shall now endeavour, in proof of the two following propositions, to present, in small compass, the very numerous statements of authors, to reconcile their apparent contradictions, and to give the results of my own observation regarding the exanthema of typhus. The points I wish to establish are;

First, That the rash in typhus is permanent; that in all cases it presents the two periods, longer or shorter, according to circumstances, of increase and decline; that, in the more severe cases, it may exhibit, during the period of increase, four different states, being florid, dark, livid, and petechial; and finally, that it is quite different from vibices and purpura, which are of rare occurrence.

Second, which partly flows from the foregoing, that the abundance, and particularly the darkness of the eruption, may be said to be proportional to the severity of the disease.

1. When I say that the rash is permanent, I mean that it does not consist of successive eruptions of spots, each of which disappears in the course of three or four days, but that the same eruption continues throughout the disease. As the accuracy of this position will be clearly brought out in treating of the changes the eruption undergoes, I shall only state that it was ascertained by surrounding a certain number of spots with ink, and observing them carefully several times daily.

Dr Copland, and Dr Peebles, to whom he refers, lay down the proposition that the "eruption usually appears from the third to the seventh day of the fever, but may be delayed till the twelfth or fourteenth day." Dr West, in his last paper, mentions that in the Vienna fever of 1757, when the disease ran its regular course, it appeared "on the fourth, or, at latest, on the seventh day."* Montault (p. 154) refers to Drogart, Biett, Rochoux, and Pringle, as having observed it generally on the fourth, fifth, or seventh, and sometimes (according to Pringle) on the 14th day. Gauthier de Claubry, (p. 75) remarks, "that of seventeen observers who make express mention of it, four noticed it on the fourth, two on the fifth, eight in the course of the sixth and seventh, and generally, all point out its manifestation between the seventh and tenth days." Dr Roupell maintains its almost uniform appearance on the third or fourth day. Dr Cowan, in his "Statistics of Fever and Small-pox in Glasgow," p. 24, says that it "generally makes its appearance from the fourth to the ninth day of the disease, occasionally at a later period." Dr Henderson states that in eight out of twelve, in whom the day on which it appeared could be ascertained, it appeared from the third to the sixth, in "the remaining four severally on the seventh, ninth, and eleventh day." I have been able to ascertain the exact date of the appearance of the eruption in a much larger number than Dr Henderson, to whose statements, in addition to the following tables, I refer for the proof of what I have advanced respecting its increase and decline. The first table refers to the time of its appearance, the second to the period at which it began to decline, the third to the date of its final disappearance.

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* Edinburgh Journal, No. 143, p. 295.

	Males.	Females.	Total.
It appeared on the 2d day in	1	1	2
3d,	2	1	3
4th,	3	2	5
5th,	4	12	16
6th,	4	9	13
7th,	1	4	5
8th,	2	1	3
9th,	1	3	4
13th,	0	1	1
	18	34	52

From this statement, it results that in more than half of the entire number it appeared on the fifth and sixth days, and that, in exactly three-fourths, it appeared from the fourth to the seventh day. Taking an average of the whole, it appears most commonly on or about the sixth day. I must, however, direct attention to the fact, that in not a few cases it was so very copious, and in several so dark, on the sixth day, as to warrant the belief that it had appeared some days before.

Dr Henderson states that the eruption began to fade "in eleven before the tenth day; in twenty between the tenth and twelfth, inclusive; in one, as late as the seventeenth."* The following table gives the results of my own observation. It refers only to forty-eight of the fifty-two cases above referred to, four having died before the eruption began to recede.

	Males.	Females.	Total.
It began to decline on the 8th day in	1	0	1
9th,	3	3	6
10th,	0	5	5
11th,	2	3	5
12th,	1	4	5
13th,	5	3	8
14th,	3	3	6
15th,	1	3	4
16th,	0	2	2
17th,	0	2	2
18th,	1	2	3
19th,	0	1	1
	17	31	48

It is evident from the above table, that we cannot fix any particular day, from the ninth to the fifteenth inclusive, on which, much more frequently than any other, the eruption begins to fade.

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* Report, &c. p. 13.

It did so, however, on one or other of these days, in 39, or five-sixths of the entire number, the average of which, (12.8), assigns the thirteenth as the day that the change most commonly takes place.

The length of this paper, already too great, renders it impossible, as its object happily renders it unnecessary, to analyse the circumstances whereon the variations I have noted depend, such as the age, the constitution, the strength, the habits of the patient, and the greater or less intensity of the disease, all of which have a material influence in modifying its duration.

I shall now, in a third table, show the various dates of the disappearance of the eruption, in forty-five cases, three more having died, very shortly after it began to recede.

	Males.	Females.	Total.
It disappeared on the 13th day in	0	3	3
14th,	0	4	4
15th,	2	1	3
16th,	2	2	4
17th,	0	2	2
18th,	2	5	7
19th,	0	5	5
20th,	1	2	3
21st,	1	1	2
22d,	3	2	5
11th, 12th, 23d, 24th, 25th, 26th, and 31st days in	4	3	7
	15	30	45

The differences in this are still more striking than those in the preceding table. It would be easy, were such a part of my present purpose, to demonstrate that the long continuance of the eruption, depends, in almost every case, on its having been dark, livid, or petechial during the disease; but, as the proof it would not aid me in my present inquiry, I go on at once to deduce some more practical inferences from the data I have furnished. Where so many disturbing forces are at work, as those I have alluded to, it would be vain to look for anything like an exact proportion between the periods of increase and decline in the typhous exanthema. Accordingly, I find, from a laborious analysis of the above cases, that though in eight the two periods agree exactly, and in eight others, very nearly, in length, they vary, in the remainder in all different proportions. As it would be quite useless here to enter into details, I shall simply subjoin the results of my calculations :—

Shortest period of increase,	3 days.
Longest do.	13
Average, do.	7.08
Shortest period of decrease,	2

Longest period of decrease,		13 days.
Average	do.	4.45
Shortest duration of eruption,		6
Longest	do.	24
Average	do.	11.59

These conclusions form a considerable contrast to Dr Copland's statements : " The duration of this eruption is from three to five days." Dr Henderson, infers " that the whole duration of the eruption occupied commonly nine or ten days,"—a result which approaches much more nearly to that I have arrived at. Though I could have adduced a much greater number of facts regarding the decline and disappearance of the eruption, I have preferred confining my attention to those patients alone, in whom the date of its commencement also was ascertained, for, having been selected for examination solely because they presented themselves in the early stage of the disease, they form a perfect group, whence general conclusions may with safety be drawn.

Before entering on the consideration of the various states of the eruption, let me refer to some of the opinions put forth respecting it. Valleix, I have already stated, holds the eruption to be always dark, and persistent under pressure, both during life and after death. " It is," says Copland, " of a florid, reddish, or reddish-pink colour; disappearing on pressure, but soon returning when pressure is removed. This circumstance is sufficient to distinguish it from petechiæ." Again, " If petechiæ occur in this fever, they seldom are observed before the eighth or tenth day, and then this eruption has usually disappeared. When the petechiæ are earlier, or the eruption continues longer, so that both exist together, they are quite distinct and different in their appearances ; for the latter is never so dark or livid as the former generally is." Further on, he remarks, " In the more malignant cases, or when petechiæ appear early in the disease, the colour of the eruption may, however, become deeper." Still further, " the petechial affection * * * may occur in the advanced stage of any fever, * * * and is not in any sense of the word, an eruption, as it has been very improperly denominated by some writers. * * * The petechiæ or cutaneous ecchymoses vary in dimensions from minute stigmata to large patches and vibices, and in the deepness or shade of colour. * * But the exanthematous eruption attending true typhus, * * * has been confounded with petechiæ, with which it is often associated in the advanced stages of the fever." These opinions agree entirely with those expressed in his paper by Dr Peebles. Dr Henderson (p. 16) has the following remarks : " Purple petechiæ, the result of ecchymosis, were frequently present in the second week of the disease. In some cases, they were very abundant, but in very few exceeded the number of typhoid maculæ, which commonly existed along with them. One vibex only was remarked in the whole number of cases. The petechiæ continued often distinct, though the eruption was declining." To disprove, as far as my observation enables me, what appears to be incorrect in these opinions, even though upheld by such high authority, is the task I now propose to myself.

The statements of authors on this subject are very numerous. Dr West, in tracing the history of the eruption downwards from the fifteenth century, cites Fracastorius and Ambrose Paré, who both speak of the eruption assuming a dark colour. Conradinus is more explicit. In the article referred to,* I find these words; "In addition to these symptoms, however, spots like flea-bites appeared on the skin of all the patients. In some cases, these spots were of larger size than others; occasionally they occupied the whole body, but usually were confined to the chest, the spinal and interscapular regions, and the arms; and they were observed to assume a livid or blackish colour in dying persons." Willis, (same paper, p. 289,) mentions as one of the symptoms of the epidemic among the troops near Oxford in 1643, an eruption of spots, some of them small, and of a bright-red colour, while others were larger, and of a more livid hue. The reviewer of Dr Roupell, formerly alluded to, says,† "the rash is not accurately described by any of the authors cited, so that it is impossible to say whether it was the same in all. One author (Pringle) does not even mention its existence." Now, as it so happens that Pringle has given, both in his work on Diseases of Armies, and in his letter to Mead, a description of the eruption so clear as to make it be referred to by most writers on eruptions in continued fevers, it may be as well to quote his own words, which have an especial bearing on this and other portions of my subject. "There are," says he, "certain spots, which are the frequent, but not inseparable, attendant of the fever in its worst state. These are less usual on the first breaking out in the hospitals; but when the air becomes more corrupted, the spots are common. They are of the petechial kind, of an obscure red colour, paler than the measles, not raised above the skin, of no regular shape, but confluent. The nearer these spots approach to a purple colour, the more ominous they are, though not absolutely mortal." The most of the authors quoted by Gauthier de Claubry mention the existence both of the "rosy and petechial eruptions," the latter coming on at a later period of the affection, and in adynamic patients.

Dr Roupell, in speaking of the opinion of some authors, that the "conversion of petechiæ into the rash is a common occurrence," has evidently, as his reviewer remarks, said the reverse of what he meant to convey to his readers. My friend, Dr Staberoh of Berlin, from observations, of which I can attest the accuracy, made in Glasgow Fever Hospital, where I then resided, drew attention to the frequent conversion of the rosy eruption into petechiæ, in a paper published in the Medical Gazette for March 1838, and in reference to it, Dr West has the following remarks: "My attention having been called to the point by a paper of Dr Staberoh, I have endeavoured to ascertain, whether, as he asserts, the spots often change into ordinary petechiæ, but have not yet been able to satisfy myself upon the point, though, from one or two cases which I have seen, in which the spots greatly resembled petechiæ, I should think that his statement is very probably correct." Dr Staberoh, in his thesis on the Exanthematic Typhus at Halle, in 1834, maintains the same opinion. Having thus, by quotations, shown that my opinion, so far from being original, has been partly recognized for centuries, and has been fully developed, of late years, by other writers, it only remains for me to offer the fruits of my own observation.

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* Edin. Journal, No. 143, p. 282.

† Med. Chirurg. Review, Vol. xxxi. p. 103.

Having observed with care, several times daily, the cases referred to by Dr Staberoh, in which a considerable number of spots were circumscribed with ink, I have seen the changes referred to going on in the most gradual manner; indeed, the fact was so clear, that I find, in my daily reports of numerous cases, taken months before his arrival, and when my attention was not particularly directed to the point, the phrases, "pale, florid, darkening, dark, livid, petechial," applied successively to the eruption at various stages of the disease. In the details I am about to give, the general principle is all I wish or need to establish; the periods at which the changes take place, I do not now seek to determine. Having specified the four states of florid, dark, livid, and petechial, I would have it borne in mind, that, when florid, the eruption disappears readily under pressure; when dark, it still disappears, but more slowly; when livid, semipetechial, or pseudo-petechial, (as it has been called,) it is only partially effaced; when petechial, it is not in the least affected by pressure. In many cases, it remains florid throughout; in others, it presents one or more, and in not a few, all these alterations; and after it has reached its height, the process is inverted, and it passes through the various phases of lividity, darkness, redness, and paleness, before its evanescence. When death took place at the time the eruption was petechial, the ecchymoses, (for they are termed ecchymoses,) remained after death—a circumstance noted by Dr West, and particularly insisted on by Valleix in the paper already referred to. Dr Henderson says, (p. 12,) "In a few, the tint was somewhat purple; and this colour could be assumed by an eruption that had formerly been scarlet." By including in the following tables, the deaths in the various groups of cases, they will serve for reference, when I come to speak, as I shall do presently, of the relation that subsists between the states of the eruption, and the gravity of the cases.

The colour of the eruption was:

	Cases.	Deaths.	Rate of Mortality.
Pale throughout, in -	34	3	1 in 11⅓
Florid - -	25	2	1 in 12½
Darkish in - -	16	2	1 in 8
Dark - -	32	8	1 in 4
Livid or semipetechial in -	15	7	1 in 2⅐
Petechial - -	17	4	1 in 4¼
	139	26	1 in 5⅓

Hence it appears that the eruption was pale in about one-fourth; florid in between one-sixth and one-seventh; darkish in between one-eighth and one-ninth; livid in rather less than one-ninth; petechial in about one-eighth of the whole cases. Dividing them, then, into two groups, we have the following result:

	Cases.	Deaths.	Rate of Mortality.
Eruption light-coloured in -	59	5	1 in 11⅘
dark-coloured -	80	21	1 in 3⅘
	139	26	1 in 5⅓

I have been thus minute in my subdivisions, in order to show more clearly the almost insensible gradations by which the rash is transformed from its florid or exanthematous, into its petechial state; and in order to demonstrate at once its difference from purpura and vibices, and the truth of my concluding position. I met with purpura spots in three, and vibices in only two cases. In one of the former, a plentiful crop of purple spots appeared suddenly on the 14th day, on the chest and belly, amid a "pale, scanty, and very small" eruption. The pulse, which had before gradually increased in frequency, was 128 on the 12th day; on the 13th, it fell to 116. It continued to fall steadily, by about six beats each day, becoming gradually fuller and firmer; the intensity of all the other symptoms diminished as steadily, and convalescence was completely established on the 21st day. In another case, a large crop of very minute spots, differing completely in colour from the eruption, which had been petechial for days before, appeared on the 12th day, on the right arm, and faded away long before the eruption. The pulse, 120 on the 10th day, fell on the 11th to 104, and on the 13th to 96, and during the four following days to 54; on the same day, epistaxis occurred, and the violence of all the symptoms diminished, but the severity of the attack left the patient exceedingly weak, and convalescence was not fairly established till the 31st day. In the third case, very numerous spots, similar to those already described, appeared around the left elbow on the 10th day, amidst a "darkish" eruption. On the same day, the patient died. The countenance, which the day before was wild, flushed, and much oppressed, is reported "languid, much better;" and the pulse had fallen from 136 to 128, and was of better strength, but an intense bronchitis and the supervention of pneumonia, with great pectoral oppression, proved fatal. The difference in the appearance of the spots is well described by Dr Staberoh. The spots of petechial eruption are ill-defined and shaded off at their margins, and have a dusky, reddish-brown colour, while the spots of purpura, besides having abrupt and very clearly defined margins, present a decided shade of blue, which, as Dr S. remarks, renders the name applied to them very appropriate. *Vibices* appeared upon the chest in one case on the 10th day, amid a pale eruption, that became afterwards more marked, while the ecchymoses grew paler. The pulse, on the 9th day 124, had fallen to 112; the state of the patient improved rapidly, and convalescence took place on the 18th day. In another, the vibices were pretty numerous, large, and very irregular in form, and appeared on the 12th day, amid livid and petechial eruption; the pulse fell from 132, the number of pulsations on the day before, to 122, and convalescence was complete on the 20th day. From these details, it appears clearly, that purpura and vibices are of rare occurrence in typhus, are quite distinct from the typhous eruption, and that, instead of being attended with peculiar danger, they would actually appear to be critical. We may also conclude that if, as Dr Copland insists, "the petechial affection is not in any sense of the word an eruption,"—"the exanthematous eruption is" not only "often associated with" petechiæ, but is often itself petechial.

I now proceed to my second proposition. Dr West, (loc. cit. p. 141,) says, that in the cases he observed "the abundance or scarcity of the eruption was not at all in proportion to the severity or mildness of the different cases." He considers petechiæ not to be particularly ill omened," (an opinion somewhat borne out by the facts stated above,) "and certainly by no means so much to be dreaded as the dark and livid hue of the eruption, and of the skin generally, which is sometimes observed." To the first assertion, so vague and so general, I oppose his own words, (at p. 290 of the Edinburgh Journal for this year,) where, speaking of Willis's account of the epidemic that broke out in the spring of

1643, among the troops near Oxford, and was for some time unaccompanied by eruption, he says, "about midsummer, the disease increased in fatality," and then goes on to give the description of the eruption already referred to. I oppose to it also the general fact, that the eruption is seen in its greatest perfection in extensive epidemics, during which the disease is much more violent and fatal; and the fact, that in Glasgow, when the cases were few, the disease very mild, and the deaths 1 in 10, or 1 in 12, the eruption, if present, was never observed; whereas, when the cases became more numerous, the disease more malignant, and the deaths amounted to 1 in 8 and 1 in 6½, the eruption became steadily more and more abundant. Dr Peebles accounts for the scantiness of the eruption in Edinburgh, at the time he made his observations, by typhus not being epidemic. Dr Henderson states the deaths among those with abundant eruption, as 1 in 5; among those with scanty eruption, as 1 in 8.3. Two of the three fatal cases in the latter class presented "extensive visceral disease of long standing;" while not one of the thirteen in the former class had any such disease. The duration of the cases was, on an average, between two and three days longer in the one than the other. My own observations, likewise, show the relation between the abundance of the eruption and the severity of the disease. The eruption was:

			Cases.	Deaths.	Rate of Mortality.
Copious.	Universally in	-	96	19	1 in 5
	Partially in	-	32	5	1 in 6.4
Scanty	-	-	11	1*	1 in 11

The dark tint of the eruption is noted as ominous by all authors. The quotations I have given above prove the general opinion; and I may likewise refer to most of the authors cited by Dr West, and Gauthier de Claubry, to Dr Tweedie, (p. 73,) and Dr Henderson, (p. 12.) The existence of a mortality in those with dark, three times greater than in those with light-coloured eruption, in the tables I have presented above, shows in the clearest manner the truth of these opinions, and renders needless any further comment. This fact ascertained, we cease to wonder at Valleix's sweeping conclusions, drawn from 6 cases, 5 of which were fatal.

Typhoid fever has also its eruption,—a circumstance much insisted on by Gauthier de Claubry in proof of its identity with typhus. It is generally agreed, (Chomel, Louis, Gauthier de Claubry, Montault, and my own experience leads me to assert it,) that it appears later than the exanthema of typhus, but that is a point of very minor importance; the main question is, are its charac-

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[*] In this one case, the eruption was petechial, and on inspection, I found disease of old standing, and aneurismal dilatation of the aorta.

ters the same? According to all the best authors on the subject, (Chomel, Rayer, Biett, Rochoux, &c.) it is distinguished from the morbilliform eruption of typhus by being distinct, rounded, slightly elevated above the skin, and of nearly uniform size. In only one case (which I saw in the Hotel Dieu last winter,) have I noticed any thing like an approach to the irregular, and very often confluent, rash of typhus, which is generally level with the skin, or if raised, is very slightly so, and that only during the stage of excitement. In all the other cases of typhoid fever in which I have seen the eruption, I should say that it appeared in small spots, rounded, and almost papular in form, being considerably elevated in the centre. Dr Perry of Glasgow was the first whom I heard maintain the complete difference of the two eruptions, and I am now fully satisfied of the accuracy of that opinion, for the following reasons.

1. The typhoid eruption is not permanent. That the typhous exanthema is so, has, I think, been shown by abundant evidence; but it is generally agreed that the rash in typhoid fever is "composed of several successive eruptions," that its duration varies from 3 to 17 days, † the mean duration being 7½, and that each rosy spot is not commonly visible for more than three or four days, and sometimes less." I have often been able to verify this remark.

2. I have never seen a single case in which the typhoid eruption became petechial or even dark, and no author I have consulted pretends that it does. On the contrary, it always retains the same characters, the last crops (and I have seen them appear the day before death, in cases where there was the most complete prostration,) being as florid as the first. Reflections on the necessary relation between the state of the blood, and the appearance of the eruption, which I cannot now develope, but which are strongly confirmed by the frequent occurrence of a buffy coat, and a pretty firm coagulum, in typhoid fever, will naturally suggest themselves to every mind.

3. It is beyond a doubt that there is no relation between the eruption and the severity of the cases. I confess that I long felt inclined to believe, that the more plentiful the eruption, the less serious the case. I was particularly led to think so by the total absence or extreme scantiness of the eruption (though carefully sought for) in the Glasgow epidemic of 1836, which was very deadly, and by afterwards finding it more or less copious in sporadic cases presenting a much less intense form of the affection. After further inquiry, I find, that though in its fullest sense the opinion is incorrect, it is to a certain extent true. From a careful perusal of the valuable work of Chomel, I find that a large pro-

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* Chomel, Leçons &c. p. 19. Also Louis, Vol. ii. p. 232, 241.

† Chomel and Louis.

portion of the worst cases, and of those who died, had either a scanty eruption or none at all; and it appears from the lucid statements of Louis,* that it was wanting in 9 out of 35 fatal cases, and that it was scanty *(en petit nombre)* in 18, or three-fourths of the remaining 26, some of them presenting only 5 or 6 spots; a number reckoned by Chomel (p.8,) of no value, 15 or twenty being necessary, according to him to "characterize the typhoid affection." Fifty-four of fifty-seven patients who had severe attacks, but recovered, had the eruption, and of the remaining three, two came to the hospital on the 14th and 40th days of the disease. "In some cases," he adds, "there was only a small number of spots." In 12, "the eruption was very abundant." It was present "in all the cases where the affection was slight," whence he infers, that "its cause is special" or specific, and that it is not like other secondary phenomena, proportioned to the gravity of the disease and the febrile movement." Hence we may at least conclude, that in severe attacks of typhoid fever, the eruption is less frequent, and generally less plentiful than in those that are less serious. Does any one object that these reasonings prove not the difference of the eruptions, but merely a different determination of one and the same eruption, in the one case to the skin, in the other to the mucous surface, which has been called "the inverted skin?"—I reply that, according to this hypothesis, (for it is a pure hypothesis,) there should be in typhus with scanty eruption, a decided abdominal determination; but the fact, as undeniable as it is conclusive, is exactly the reverse; for numberless cases of typhus with scanty eruption are remarkable only for their mildness, and the absence of any visceral complication. This is particularly the case in children in whom the eruption is seldom seen.

We may also conclude generally, that the facts detailed go against the opinion of Chomel, (p. 336,) that "the cutaneous exanthema offers the same characters in the two affections; the only differences being in the number of the spots, and the time of their appearance," and that, on the contrary, the typhous differs from the typhoid eruption in its form, its duration, the changes it undergoes, and the relation it bears, as to colour and quantity, to the severity of the disease.

V.—In the plan I laid down, I proposed to consider some of the anatomical lesions. To enter on a comparison of the whole pathological anatomy of the two diseases, were a task as tiresome as it would be barren of any definite results. Instead, therefore, of inquiring into the state of all the organs in all the different cavities, I shall at once meet the question, Is the lesion of Peyer's glands, so constantly met with in typhoid fever, frequently, or is it ever found in typhus?

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* Louis, Vol. ii. p. 231, et seq.

Chomel (p. 339,) appears to me to put the question in its true light. His third general conclusion is as follows; "If further observations demonstrate in typhus anatomical lesions similar to those met with in the typhoid affection, the identity of the two affections would be put beyond a doubt." To the philosophic caution of the inference of the French professor the following remark offers a strong contrast. A reviewer of various works on typhus and typhoid fever, in the British and Foreign Medical Review for last year, after asserting (p. 432,) that the symptoms during life are the same, and quoting a passage from Gauthier de Claubry, (referring to the experience of four out of twenty-two observers who described the epidemics of army typhus during the wars of the empire, as decisive of the question,) thus proceeds, "we do not know that any additional facts from the morbid anatomy of the intestinal canal are required. In our own country we do not require any argument to persuade us of the identity of these supposed distinct diseases; the evidence is constantly before our eyes!" Montault, notwithstanding the assertion of his reviewer, that his remarks are valueless, points out clearly the absence of the intestinal affection in typhus, and cites numerous authors to that effect. Roupell considers the absence of this lesion, which he fully admits as accidental; Tweedie combats strenuously the opinions of Broussais, (p. 57,) and adduces the frequent absence of intestinal lesion as proof of their incorrectness. I remarked at the outset that, in the cases detailed by Dr Tweedie, there were evidently two kinds of fever, the one distinguished from the other during life, by difference of intensity and duration, and after death by the lesions observed. I point of fact, I find 13 cases in which ulceration of Peyer's glands had taken place, and nine in which there was no intestinal lesion whatever, but general congestion. Dalmas, in his account of what he heard and learned (not saw,) at Dublin, cannot deny that the lesion is frequently absent; but only says, "it is perfectly well known" there. So it was in Glasgow, but even to me, a perfectly inexperienced observer, the distinctive symptoms were well known also. Gauthier de Claubry, evidently feeling the force of Chomel's remark, has laboured hard, throughout a very large portion of his work, to get rid of this very strong objection to his opinion. Reveillé Parise, on whose testimony he lays much weight, observed in those who died at Saragossa, "some gangrenous points in the interior of the intestines, and on the exterior violet patches," (p. 18.) Ducastaing (p. 16,) found in many of those who fell victims at Gaëta in 1802, "the mucous membrane ulcerated in several points." Tresat, at Walcheren, in 1809, found "gangrene of some parts of the intestinal canal," (p. 19.) Tort, at Dantzick, in 1813, found "the small intestine sprinkled with gangrenous eschars," (p. 23.) Gilles de la Tourette, at Torgau, in 1813, found serous and bloody effusions, inflammations, ecchymoses, gangrenous spots of the mucous and serous membranes," (p. 24.) MM. Laurent and Ardy, Magnin, and Fauverge, mention inflammation, ulceration, gangrene in some points, violet patches, scirrhous indurations of the mucous membrane of the small gut, as occurring in the Mayence epidemic of 1813, (p. 26–7.) Thouvenel, in the department de la Meurthe, the same year, found "generally some gangrenous spots in several parts of the membranes of the intestines," (p. 35.) In the epidemic of the Salpetrière in 1814, Pellerin, "in adynamic fever with diarrhœa, which," says Gauthier de Claubry, "he apparently believes a distinct disease in this circumstance," describes ulcerations that seem to correspond very closely with those found in typhoid fever, as "often," not always met with.

After the foregoing investigations are we not warranted in considering it, with Pellerin who witnessed it, "a distinct disease?" Chomel, also, with his customary caution, when speaking (p. 337–8,) of the same epidemic, remarks that he "cannot place entire confidence in his recollections." If such disease, as is daily found in the intestines of persons dying of typhoid fever, had been present, it could not, I should think, have been easily forgotten, Is it, then, really on such statements as these, on the existence of "violet stains" and "gangrenous spots," (which might, for aught we know to the contrary, have been the effect of decomposition, in a disease that often terminated with frightful rapidity,) that Gauthier de Claubry and his reviewer would rest the decision of the question at issue? It was but yesterday, that I saw at M. Barth's rooms, large elliptical patches of ulceration in the jejunum of a female, who had died of puerperal fever, with rupture of the uterus and peritonitis,—ulcers which, had they been found in a patient who had presented the ordinary symptoms of typhoid fever, would certainly have been looked upon as characteristic of the disease. Is, then, puerperal fever identical with the typhoid affection? I also saw a few days since, at M. Barth's, in a portion of gut taken from a patient who had, I believe, died of phthisis, large patches, of no determinate shape, extending around the whole calibre of the tube, the mucous membrane being in these parts immensely swollen, raised a couple of lines above the surrounding surface, traversed by deep rugæ, and having a greenish-black colour, with the characteristic gangrenous fœtor. Is it beyond the range of possibility, that such may have been the state of the intestines in the army epidemics referred to? Is it not rather highly probable that, where everything indicated a deeply altered and corrupted state of the blood, and local gangrene was of frequent occurrence, the gut. as altered by all the observers cited, may have been actually sphacelated? All that I have in view in these remarks is to demonstrate that, even were the existence of such lesions proved beyond a doubt, the alteration of the glands of Peyer, and the isolated follicles, now called characteristic, is very far from being proved thereby.

But are there no facts that bear against the reasonings of the French essayist? On the contrary, there are many. Lombard has graphically described his surprise on finding no lesions whatever in several cases he saw inspected while in Scotland and Ireland. We have seen the supposition Gauthier de Claubry has recourse to, in order to explain away his testimony; and, even granting that "the circumstances of misery and exhaustion," in which, according to him, the people of Scotland are placed, do, as he supposes, produce a strong resemblance in the prevailing fever to army typhus, (p. 143,) does he advance one step towards a removal of the difficulty, by gaining such an admission? Nay, rather, if M. Gauthier de Claubry has made out his position, that the intestinal lesion is present in typhus as well as in typhoid fever, whence this allusion to army typhus to explain the want of intestinal lesion— an allusion by which he demolishes the structure his work was intended to raise, and unwittingly discloses his own distrust in his own opinions? Again, M. Delbosc, (cited at p. 38,) in his account of the epidemic at Alby in 1823, mentions only "a rosy colour of the peritoneal tunic," and M. Keraudren and the Toulon physicians, "though their attention was specially directed to that point by the questions addressed to them by the Academy of Medicine,[*] never observed any intestinal lesion in the typhous epidemic at Toulon in 1829–30. I have already referred to Dr Tweedie's data, and have cited M. Dalmas's silence as impartial evidence, though in the united kingdom very few require evidence to convince them, that in Dublin, as elsewhere, a form of fever exists, of highly malignant character, and most extensively fatal, in which no intestinal lesion is found even on the most careful inspection. Dr Alison of Edinburgh, (from whom I cannot quote accurately, not having access to his work,) corroborates the experience of other observers.[‡]

I now proceed to give some more circumstantial details upon this interesting subject. Dr West[†] gives the results of ten inspections. In five, (I merely speak of the state of the bowel,) "there was no morbid appearance whatever;" in the other five, "there was increased vascularity of the intestinal canal, extreme in one instance." "Once the glands of Peyer appeared enlarged, and twice there was very considerable enlargement of the solitary glands; but I never," says he, "found them ulcerated. Once the mucous membrane of the cæcum was very much softened and congested, and there was slight abrasion of the surface of some of the congested patches." Dr Reid[*] states, that of 101 cases examined in the Edinburgh Infirmary, by his predecessor, the late Dr Home, the elliptical patches were well defined in 29; they were more or less ulcerated in seven of that number," and in two out of the seven, perforation had taken place." He next gives[†] a summary of the morbid appearances in 41 cases inspected by himself. In 24, Peyer's glands were apparent and distinctly defined;" in 6, "scarcely visible;" in 11, invisible to "the naked eye." In 4 only were they "distinctly elevated;" and in 2 of the 4, "this elevation was to no great extent, and limited to a few patches." In 2 only was there "any appearance of ulceration." In 4, the solitary glands were "distinctly visible." Regarding the connection of the symptoms during life with the *post mortem* lesions, he says,[‡] "in 9 cases only out of the 24, in which the elliptical patches were distinctly visible, were there any abdominal symptoms during life, and in some of those cases, these certainly could not be referred to any affection of the elliptical patches of Peyer." "In one case in which they were not visible, the bowels are stated to have been rather loose, the stools watery and dark-coloured. In other two cases, there was considerable abdominal tenderness, without diarrhœa."

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[*] Chomel, p. 338.

[†] Edin. Journal, Vol. 1. p. 132–3.

[‡] Dr Alison has published no separate work, but Observations, &c. in the twenty-eighth Volume of this Journal, p. 233.—Ed.

I shall preface with a few remarks, the two following and concluding tables, which give the results of my own observation. They refer to 22 inspections,—but a small number, it is true, yet made with as great care and attention to accuracy as I could bestow on them. The solution of the interesting question, Is there any connection between the abdominal symptoms during life, and the state of the intestinal follicles in typhus? may be attempted in different ways. We may compare the symptoms, whether positive or negative, with the mucous follicles, as regards 1. their number, and 2. their degree of developement. And, after having, as far as our data enable us, determined these points, we must not be unmindful of the objections that may be urged, as, for instance, that our terms are vague; that our cases are too few to draw conclusions from that absorption of morbid matter may have taken place before death, or, it may be, that death has arrived before its deposition was possible. I shall meet some of these objections before-hand. The cases, I acknowledge, are few, but I maintain that they are a fair sample of hundreds that occur yearly, and at the same time direct attention to the numerous facts I have already cited. To take away all vagueness from the terms I employ, I make the following statements respecting the state of the intestinal follicles. It was very rare, in the cases of typhus, which I either inspected or saw inspected, during a two years residence in Glasgow Infirmary, to see these glands elevated a quarter of a line above the surrounding mucous membrane, and in the vast majority, it was very difficult to determine whether they were really elevated or not, the slight roughening or irregularity of their surface often causing a visual deception. When, therefore, we speak of the elevation of the aggregate glands in typhus, we are no longer occupied, as in typhoid fever, in the measurement of palpable magnitudes, but for the most part, with elevations, which French pathologists, as I have frequently witnessed, scarcely reckon any deviation from the healthy state. To avoid overlooking, not one, but many, of these (enlarged ?) glands, often requires very minute attention. The other objections I shall leave to be answered by the facts about to be adduced, only remarking that the removal by absorption of the morbid matter from the follicles is a very rare termination, even in typhoid fever. Chomel mentions two cases in which that process had probably taken place,* and I cannot see why it should be more common and more speedy in typhus. The first of the following tables refers to the number of follicles met with in the small gut; the second to their state of developement.

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[*] Report, &c. p. 33.

Ibid. pp. 30, 31.

Ibid. p. 34.

No. of enlarged follicles.	Cases.	Diarrhœa.		Consti-pation.	Tympanites.			Abdominal pain.			State of follicles.			
		Sponta-neous.	Consecu-tive.		Slight.	Consider-able.	None.	Slight.	Acute.	None.	Elevated.	Very slightly so	Not ele-vated.	Scarcely seen.
none, .	1	1			1			1						
1 to 5, .	4	2	1	1	1	1	2	1	2	1				4
5 to 10, .	4		3	1	1	1	2	4				2		2
10 to 15, .	4	1	1	2	1	2	1		3	1		2	2	
15 to 20, .	3		2	1		2	1		3			3		
20 to 30, .	4		1	3			4	2		2	1	1	2	
30 to 40, .	1		1		1			1			1			
40 to 50, .	1		1		1				1				1	
	22	4	10	8	6	6	10	9	9	4	2	8	5	6

Intestinal follicles.	Cases.	Diarrhœa.			Tympanites.			Abdominal pain.		
		Sponta-neous.	Consecu-tive	Constipa-tion.	Slight.	Consider-able.	None.	Slight.	Acute.	None.
Distinctly elevated in	2		1	1	1		1	2		
Very slightly elevated,	8	1	4	3	1	3	4	3	4	1
Not elevated, .	5		2	3	2	1	2		3	2
Scarcely seen, .	6	2	3	1	1	1	4	4	1	1
	21	3	10	8	5	5	11	9	8	4

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* Observ. 14 and 15, pp. 169, 173.

Thus, we see that 4 only of the 23 in whom diarrhœa was spontaneous, rank in the above list. In one of the 4, the diarrhœa depended on an attack of simple enteritis, which came on after partial convalescence, and carried off the patient on the 34th day. No trace of follicular disease was found on inspection, but "universal softening of the mucous membrane from the duodenum to the rectum." Two of the remaining 3 may almost be said to have presented no trace of follicular disease, for the 3 or 4 follicles observed in each were barely perceptible to the naked eye. In the fourth, 14 Peyer's glands, scarcely at all elevated, were detected. But, what chiefly concerns us to notice is the striking fact, that, as the number of enlarged follicles increases, the cases of spontaneous diarrhœa diminish, and those in whom consecutive diarrhœa and costiveness were observed, become more numerous. In fact, not one of those in whom the greatest number of enlarged follicles was observed, but was either constipated, or had diarrhœa brought on by medicine, during life. This confirms our former deductions, agrees entirely with those of Valleix, and shows that the appearances observed in typhus depend upon local irritation, and not on specific disease.

It will also be observed that, in 10 of the 22, (including 5 of those in whom from 15 to 30 enlarged glands were observed,) the feel of the abdomen was natural throughout the disease. Of the 6 in whom the belly was slightly tympanitic, that symptom was observed only one day in 4 patients, (the one in whom the greatest number of enlarged follicles was found being among them;) in one with forty enlarged glands, it was present during two days; the sixth was the patient who died of enteritis. Of the six, on the other hand, who presented a high degree of tympanites, in not one were there so many as twenty, and in one whose abdomen was excessively distended, scarcely a trace of follicular disease was detected.

There seems, at first sight, to be more connection between the presence of abdominal pain, and the number of altered glands, but this is only apparent, for a reference to the figures given above shows, that, in eight of the nine in whom the pain was acute, not more than 20 were found in the whole course of the gut; that, of the nine who complained of slight pain, they were either not at all, or very slightly affected in six; and that, if two of those, in whom they were noticed in large number, (20 to 30), had slight pain, two more of the same group had no pain at all, at any period of the disease. The concluding part of the table proves that quite as little analogy exists between the number of follicles and their degree of developement. As a fitting commentary on what I have now advanced, I find that in the only case in which considerable elevation of Peyer's glands, (about half a line), and a few ulcers (not follicular) in the cæcum, were observed, the bowels were obstinately constipated, the feel of the belly was natural throughout, and the abdominal pain was either exceedingly slight or absent, till within a few hours of death, having come on after the administration of a clyster, composed of equal parts of turpentine and castor-oil.

These remarks are still further confirmed by a reference to the second table, in which the symptoms are considered with respect to the degree of developement of the follicles. The same dependence of the intestinal lesion on local irritation, the same entire disproportion between the extent of the lesion, and the intensity of the symptoms, are brought out so clearly by it, as to render any further reflections needless. The utter futility of the objection founded on the possible absorption or non-deposition of morbid matter, will appear from the following facts. Comparing the number of follicles with the days of death, I find that, of those belonging to the first group, one died on the 12th, another on the 13th, a third on the 14th, and a fourth on the 16th day. Of the second group, two died on the 12th, another on the 17th, and a fourth on the 36th day. Of the third, one died on the 10th, one on the 14th, the other two on the 21st and 24th days. The three belonging to the fourth group died severally on the 13th, 15th, and 19th; those in the fifth, on the 10th, 11th, and 13th, the two in the 6th and 7th, respectively on the 11th and 22d days of the fever. Thus, then, of two who die on the same day of the affection, one presents scarcely a trace of disease, another as many as thirty enlarged glands. In one who dies on the 11th day, no less than forty Peyer's glands are observed, while in others who die on the 12th, 13th, 14th, and 16th, scarcely any morbid appearance is detected; in another, who dies on the 22d, no less than 45, while in a 7th, who dies on the 24th, only 10 or 11 Peyer's glands are obscurely visible.

Again, if we consider the developement of the glands, in reference to the day of death, we find that, of the first group, one died on the 10th, another on the 11th day; of the second, one on the 10th, another on the 11th, a third on the 13th, a fourth on the 15th, and the remaining four, respectively, on the 17th, 19th, 24th, and 36th days; of the third, one on the 11th, another on the 13th, a third on the 14th, the remaining two on the 21st and 22d days; of the fourth, three died on the 12th, and the remaining three severally on the 13th, 14th, and 16th days. Thus two die on the 10th and 11th days with Peyer's glands distinctly elevated, (in one of them to the extent of about half-a-line;) they are scarcely discernible in four who die on the 12th and 13th days; while they are in a state of slight elevation in eight, who die on all different days between the 10th and the 36th. Does this, I ask, look like the steady course of a constant lesion, depending upon a constant and specific cause?

The solitary glands were visible, in small number, in three cases; in one, in the small, in two, in the large intestines. I have, however, seen them very numerous, both in the one and the other, though they were never larger, and seldom so large as a pin's head. They were white, sometimes surrounded with a vivid red areola, and each had a small black point in its centre. The aggregate glands, situated on the free border of the gut, were of all sizes from two or three lines to two or three inches in length, and varied from a couple of lines to nearly an inch in breadth. They were sometimes white, sometimes grayish, sometimes slate-coloured, frequently dotted over with small black points, often reticulated, while sometimes neither the one nor the other appearance was noticed. It is a remarkable fact that, in several cases, the glands were much more numerous in the jejunum than the ileum, and that in two there were none near the ileo-cæcal valve. Not unfrequently, the mucous membrane around them was pale, at other times they were situated amid patches of very dark congestion; in which case they partook more or less of the dark colour of the surrounding membranes. Sometimes, but very seldom, the mucous membrane itself was reddened, and injected with minute vessels; the congestion of the veins of the submucous cellular tissue was, on the contrary, very common.

No one denies the very frequent affection of the mesenteric glands in typhoid fever. The experience of every one who has seen the inspections of patients cut off by that disease must confirm the facts stated by Chomel, Louis, and Petit and Serres. Though very rare in typhus, it is nevertheless sometimes found. I find it noted by Dr Tweedie in two cases, (1 and 44). In the former, "the lungs and abdominal viscera were healthy, excepting the mesenteric glands, which were enlarged and partially affected with suppurations of a scrofulous character (p. 108.") In the latter, "there was no ulceration of the intestines, but the glands of the mesentery were enlarged." Of my own cases, the mesenteric glands were enlarged in four; in one very slightly, in two in a greater degree, in a fourth to a large extent, but not suppurated. In the first, death took place on the 11th day, and twenty or thirty Peyer's glands, not at all elevated, were found in the small gut; one of the next two presented eight very slightly developed, the other none at all; and in the fourth, there were nineteen very slightly elevated. In all of those, then, in whom the enlarged follicles were very numerous, including the only patient in whom they were considerably elevated, the mesenteric glands were unaffected.

I have been enabled, by the kindness of Dr Reid, to present the reader with a much larger mass of information. From the publication of the Report, till the end of June, 33 cases of fever were inspected in the Edinburgh Infirmary. Of that number only two presented the characteristic lesion of the intestinal follicles met with in typhoid fever. In both of them the lardaceous deposit *(plaque gaufrée)* was most distinctly seen, and both the aggregate and solitary glands were affected in great numbers, the latter forming the whitish " flattened tumours" so well described by Louis. Neither of the patients belong to Edinburgh; both were workers on the Edinburgh and Glasgow Railway, and were sent from Linlithgow. If, then, *dothinenteritis* is the same disease, and depends on the same causes, as typhus, how does it happen that the former is produced at Linlithgow and at Anstruther, and not in Edinburgh, where the latter is constantly occurring, and where so many circumstances favourable, not only to its production, but, (by the hypothesis,) likewise to that of dothinenteritis, are always at work? The duration of these cases is also remarkable. The one, it appears, had been four, the other five, weeks ill. One of them had convalesced, but had a relapse, of which he died; and, on dissection, the intestinal follicles and mesenteric glands were the only parts diseased, so that the relapse cannot be referred to any lesion of any other organ. It is further remarkable, that the aggregate glands were in a state of advanced ulceration, while most of the solitary glands around them were quite entire. In the remaining 31 cases—

Peyer's glands were distinctly elevated, but not ulcerated, in	4
visible, but not elevated, in	9
scarcely visible in	7
not visible in	11
	31

The solitary glands were slightly developed in two of the above cases. The mesenteric glands were healthy in 25, slightly enlarged in 4, considerably enlarged and softened in 1, and in a 6th increased in size, and partially converted into chalky matter. Dr Reid also informed me that, in a man who died lately of the effects of compound fracture, Peyer's glands were more distinctly diseased than in any case of typhus he had met with.

Having thus entered pretty minutely into the pathological anatomy of typhus, I put it to every one who has ever seen the two diseases, or read the descriptions given by the best authors, of the lesions so constantly observed in typhoid fever, whether those found in the former disease can with any truth be called " perfectly identical" with those of the latter. That the existence of trifling intestinal disease in typhus attests its general family resemblance to typhoid fever, as the presence of organs in a rudimentary state shows the analogy subsisting between individuals of different species in the animal kingdom, might be more readily admitted; but that they are one and the same species, numerous well-established facts seem most clearly to disprove. If asked to describe shortly the pathology of typhus, I might sum it up in these words:—general congestion, no prominent local disease—a congestion so general and so excessive as is rarely, if ever, met with in typhoid fever or any other disease,—a congestion singled out by most authors as one of its leading characteristics—a congestion that is evident, during life, by the livid skin and petechial eruption, and is found, after death, to have affected more or less every organ in the animal economy,—a congestion so constant as to be often passed over as almost valueless, but which future researches may prove to be the grand peculiarity of typhus; and which, in common with many other considerations, directs attention to the blood as the essential seat of the disease. If required, on the other hand, to give a brief account of the pathology of typhoid fever, I should be inclined to sum it up in these words:—prominent local lesion, comparatively little general congestion.

VI.—From the treatment of the two diseases we can infer but little. The interesting discussions held at various times on the subject in the Academie de Medecine,* strikingly show the discordance of sentiment that prevails in France on the treatment of *dothinenteritis*. One upholds the purgative system as the best and the only proper one, another condemns it as fraught with the greatest danger; one insists that the rational method, which consists in combating symptoms as they arise, is the only rational one, but another condemns it as most irrational, because it kills one in three; one strongly recommends the frequent use of the lancet, according to his formula, even in advanced stages of the disease; while another, condemning not only the lancet, but all treatment whatever, advocates a method in the purest sense expectant, and unlimited faith in the workings of nature, any attempt to interfere with them being attended with evil results. And every one has facts on his side. The most remarkable statements, perhaps, of any, are those of Professor Bouillaud, who, employing his "bleeding formula," (viz. small bleedings repeated two or three times daily, sometimes even during the adynamic stage, when the patients presented "fuliginous teeth and tongue, and the last degree of prostration,) and including only those cases that were somewhat serious, found a mortality among his patients of one in 6.5.* Again, at one of the meetings in March 1837,† he declared, that, " counting all the cases, he had lost only one in 24, and including all the slight cases, one in 16 or 17?" Who that is acquainted with typhus, and has seen the sudden and alarming asthenia that often follows the abstraction of a few ounces of blood during a state of great excitement and oppression, but must feel convinced that, treated after M. Bouillaud's method, 99 out of every 100 would die? Gauthier de Claubry, while he concludes, from his own experience of typhus, and the statements of numerous distinguished authors whom he cites that " blood-letting (p.153) may be useful, if not absolutely indispensable in certain cases, indifferent in a great number, hurtful in many others," (an opinion he shares with Pringle, Hildenbrand, and the immense majority of British physicians,) confesses, (p. 167,) that the general opinion is in favour of its use in typhoid fever; and besides referring to the constant employment of it in the beginning of typhoid fever by Louis and Chomel, states, that " twenty years of an extensive practice, and of observations made in the hospitals of a large city, as also a comparison of the results of the private practice of a great number of physicians," have led him to adopt a similar treatment. As to the use of purgatives, I may state, that while in Glasgow they were generally used in typhus, the marked difference in the state of the bowels in typhoid fever led to the general use of opium, either alone, or combined with mercury and chalk. All, in short, that we can infer from the practice at present in use is, that the treatment generally proscribed in the one is generally adopted in the other disease.

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* See more particularly those on Delarroque's Memoirs, in the "Bulletins de l'Academie" for March 14th, 21st, and 28th, and April 4th and 11th 1837. Also Bouillaud's statements at Vol. i. p. 250.

On a review, then, of all that has been advanced, it would appear that typhus and typhoid fever present important differences, as regards their probable origin, their proximate causes, their course, many of their symptoms, their diseased appearances, and the treatment applied in each. Are they then identical, or are they not? I feel that it would be presumptuous in me to hazard a direct reply; nor do I demand an answer in the affirmative merely on the faith of what I have stated. All I can ask or wish for is careful, extensive, and minute inquiry, without prepossession or love of system, and a satisfactory solution must soon be arrived at.

" Notwithstanding all the works," says Chomel, (p.338,) " which the last few years have produced on the typhoid affection, its identity with typhus, though probable, is not yet certain; and yet there are few questions of which the solution would be so highly important." I have accordingly attempted in the preceding pages to concentrate attention, as far as lay in my power, on the leading peculiarities of the two affections; I have endeavoured, by frequent reference to the works of approved authors, by collecting together valuable facts hitherto widely scattered, and by adding the results of my own observation, to bring as large a mass of information as possible to bear on the question in debate; I have attempted—with what success others must judge—to establish certain important distinctions between the two diseases; I have particularly sought to found my conclusions on practical knowledge rather than theoretical reasonings; and if I have contributed towards the elucidation of this obscure subject, or shall be successful in drawing the attention of abler and more experienced observers to its investigation, my trouble is more than repaid.

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* Séance de l'Academie, Octobre 16, 1835.

† See Bulletins de l'Academie, Vol. i. p. 520.

ART. III.—*On the Action of Saline Substances when introduced into the Vascular System.* By MR JAMES BLAKE, M. R. C. S. [Read at the Academie des Sciences, Paris, June 3, 1839.]

To the Editor of the Edinburgh Medical and Surgical Journal.

SIR,—I shall be obliged by your inserting this short notice of an important error which appeared in No. 139 of your Journal. It is there stated, page 335, that experiments performed subsequently to those which I brought forward at the British Association (where the memoir was originally read) had proved that I had wrongly attributed the action of the salts of soda, as related by Magendie, to result from a paralysis of the heart, although I did not consider that they arrested the circulation in the lungs, as that distinguished physiologist had asserted.

In the paragraph I forwarded to you, and which was meant to be inserted in the form of a note, I stated, "That the salts of soda appeared to produce death by stopping the pulmonary circulation. The only point in which I differed from Magendie, was as to the manner in which this was produced; he referring it to effusion in the substance of the lungs, caused by the blood being rendered more fluid, whilst in my experiments I had observed often, when the passage of the blood through the lungs had been evidently arrested, that no effusion had taken place."—Such must have been the substance of the note which I forwarded you, for I find in reference to my journal that such were the phenomena which I had noted in experiments performed in October and November, five months previous to the publication of the memoir. A note to this effect was forwarded with the MS. of the memoir inserted in the number of your Journal for last July, but, owing to some cause, it was not published.—I am, Sir, your obedient servant,

JAMES BLAKE.

13, *Conduit Street, London,*
July 12, 1840.

THE following memoir, contains an account of some experiments, that have been performed with a view of ascertaining the phenomena, that follow the introduction of certain salts into the blood.

The subject is one that has attracted the attention of physiologists during the last century, as regards its application to therapeutics; but it appears never to have been investigated in a purely physiological point of view, or as furnishing a means of elucidating some of the complicated phenomena, that depend on the reaction taking place between the various tissues and the blood. It is evident, however, that the facilities which various mineral substances afford of producing certain definite changes in the circulating fluid, render them valuable reagents for the physiologist. A careful observation of the effects they produce on the animal economy, accompanied with an analysis of the changes they produce in the blood, cannot fail to throw some light on many important questions in physiology.

Owing to the present imperfect state of organic chemistry, the physiologist is unfortunately prevented from deducing from these experiments, all those advantages which a more perfect state of that science would enable him to command, did it but allow him to trace the changes that the blood undergoes by its contact with these substances. It is this consideration, that, in the present memoir, has confined me to the mere detail of the facts observed, trusting, however, that these will be found of sufficient interest to render them worthy the attention of this scientific body.

In a subject like the present, it would be useless for me to attempt to enter into a history of the experiments that have been performed by previous observers. A most compendious account of these will be found in a work published by Scheele.

From the details given by this author, it appears that some of the facts I have now to bring forward, had been already published; but the researches of those who have previously investigated this subject, being wholly applied to the therapeutical action of these substances, when introduced into the blood, led them to neglect its investigation in a physiological point of view. Some interesting experiments have also been brought forward by M. Magendie, in connection with this point, in his " Leçons sur les Phenomenes Physique de la Vie," a work to which I shall have occasion again to allude. In a memoir, on the general effects produced by substances when injected into the veins, which I read at the meeting of the British Association for the Advancement of Science, in 1838,* I alluded to the effects which certain salts appeared to produce on the animal economy; but at that time I had not sufficiently investigated the action of these substances, to enable me to arrive at those general conclusions, which a more extended series of experiments have led to.

The present memoir will contain the result of experiments that have been performed with some of the salts of potass, soda, ammonia, baryta, lime, and magnesia. These salts, although, chemically speaking, of so heterogeneous a nature, yet, when considered according to their physiological action, readily arrange themselves into two distinct classes. The grounds on which this division has been founded are, that amongst the substances above enumerated, there are some that prove fatal by destroying the irritability of the heart, the moment that blood containing them in any quantity, is circulated over its parietes; whilst others as rapidly destroy life, by arresting the circulation of the blood through the pulmonary capillaries. The close analogy that prevails between the action of all those substances belonging to the same class, will supersede the necessity of my bringing forward experiments to illustrate the effect produced by each individually, for a careful analysis of the phenomena that follow the introduction of any one of these substances into the vascular system, will make us acquainted with the action of all those in the class to which it belongs. This opposition in the physiological action of these substances, is also combined with an interesting difference in their chemical composition, those which arrest the passage of the blood through the lungs being only found amongst the salts of soda, all of which, as far as their action has yet been investigated, as well as the alkali itself, exert this peculiar effect on the pulmonary circulation; whilst the whole of the salts of potash, ammonia, baryta, lime, and magnesia, which have been used in these experiments, will be found to destroy life by paralysing the heart.

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* See Edin. Med. and Surg. Journal, No. 139, Vol. li.

Expt. 1.—The following experiment will serve to illustrate the effects of soda and its salts, when injected into the veins. A tube was inserted into the jugular vein of a strong full-grown dog, weighing about fourteen pounds. Another tube was inserted into the femoral artery, in order to connect the arterial system with the hemadynamometer, an instrument of the greatest value in all researches connected with the circulation. A solution containing fifteen grains of pure soda in six drachms of water was injected into the jugular.* Six seconds after the introduction of the injection, the pressure in the arterial system began to be diminished; in twelve seconds, the pressure in the arteries, which, at the commencement of the experiment was equal to a column of mercury, of from 4.5 to 6 inches, had diminished so as to support a column of mercury, of only 1.2 inches. From the oscillations of the mercury, however, it was evident that the action of the heart still continued, so that this sudden decrease of the pressure in the arterial system, could only be accounted for by supposing, that the supply of blood to the left ventricle was cut off. The animal was dead in about forty-five seconds after the introduction of the poison, but as I shall now only endeavour to prove the local action of this substance, the general symptoms that manifested themselves will be subsequently noticed. The thorax was opened immediately after the death of the animal. The left auricle and ventricle were found to be still contracting. The right cavities of the heart were so distended with blood that any contraction of their parietes was impossible, but on allowing the blood to escape, the contractions of the auricle and ventricle again commenced. The blood that escaped from the right side of the heart was of a dark colour, and coagulated but imperfectly. The left ventricle contained a small clot of scarlet blood, which was perfectly coagulated.[*]

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* At the period of the publication of my former experiments on this subject, I had not sufficiently appreciated the advantages which they afforded for determining the rapidity of the circulation, and, therefore, did not take those precautions for marking the exact moment at which the phenomena occurred, which I have since been led to do. This will account for some slight discrepancies which may be remarked in the two sets of experiments. Those which I now bring forward have been performed with the greatest care, in order to arrive at correct data on this point, the importance of which is shown in a memoir on the action of poisons, read before the Royal Society in August last, and which was published in No. 142, Vol. liii. of this Journal.

I regret that, on former occasions, when speaking of the hemadynamometer, I have neglected to mention the name of its talented inventor, M. Poisieulle. I gladly avail myself of this opportunity of repairing my omission, and of adding my testimony as to the importance of the discoveries with which this distinguished physiologist has enriched the science.

The whole of the venous system was much distended with blood. The lungs were not much congested, of their natural consistency, nor had any effusion taken place in their tissue.[†] The sudden cessation of the supply of blood to the left side of the heart; the absence of blood containing the alkali from the left cavities; the congested state of the right cavities and venous system, would all tend to show that it is by obstructing the passage of the blood through the lungs that these substances produce their effects.

Expt. 2.—The following experiment furnishes a still stronger proof of the action of this class of substances on the capillaries of the lungs. A drachm of nitrate of soda, dissolved in six drachms of water, was injected into the jugular vein. Although this quantity of the salt appeared sufficient to stop the passage of the blood through the lungs, yet it would seem that the right ventricle was subsequently able to overcome the obstruction. As in the last experiment, the mercury in the hemadynamometer fell shortly after the introduction of the salt into the vein, and the animal lay apparently dead during the space of two minutes, not the slightest respiratory movement taking place during that time. At the end of this time, however, respiration again commenced, the pressure in the arterial system became increased, and the animal seemed to recover a degree of consciousness. The respiratory movements soon became very rapid and short, and at the end of five minutes were again suspended, the animal dying from asphyxia, owing to the production of a great quantity of frothy fluid in the lungs, which completely filled the air-passages escaping from the nostrils, and which must have prevented the air from coming in contact with the blood. On opening the thorax a considerable quantity of this frothy fluid again escaped from the nostrils, and the air-passages were found completely filled with it. The lungs were rather congested; but no effusion appeared to have taken place in their tissue. The blood coagulated firmly a short time after death. The abundant secretion formed in the air passages furnishes a sufficient proof that this salt must have exerted some peculiar influence on the capillaries of the lungs. When a more concentrated solution of nitrate of soda is used, the circulation through the lungs is completely arrested.

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[*] Sometimes the whole of the blood containing the alkali appears to be expelled from the right side of the heart, before the circulation through the lungs is arrested, a portion of it being even sometimes found in the left ventricle, although it never arrives there in sufficient quantity to circulate through the arterial system.

[†] In an experiment related by M. Magendie in his "Lecons sur les Phenomenes Physique de la Vie," in which a solution of subcarbonate of soda was injected into the veins, this distinguished physiologist attributes the arrest of the pulmonary circulation, to the effusion that had taken place in the pulmonary tissue, owing to the fluid state of the blood. I think, however, that this effusion in the lungs is more probably the result of the action of this class of substances on the capillaries of these organs,—an action which is always exerted whether effusion take place or not.

These experiments are, I think, sufficient to prove the correctness of the opinion above advanced, of the action of these substances on the capillaries in the lungs. I shall now proceed to notice the general effects that follow the introduction of these substances into the veins. Although these effects are such as would lead us to place soda and its salts amongst the most rapidly fatal poisons, yet it will appear that the symptoms they produce can be fully accounted for by their local action on the capillary circulation in the lungs. In an experiment (Expt. 1,) already alluded to, in which a solution containing fifteen grains of soda was injected into the jugular of a dog, the following are the symptoms observed: Ten seconds after the introduction of the injection, the respiratory movements became suspended, a state of violent opisthotonos coming on. The spasm appeared to increase until about thirty seconds after the introduction of the poison, at which time it was at its height. It then gradually relaxed, and forty-five seconds after the injection, the animal lay to all appearance perfectly dead. One or two deep respiratory movements took place about a minute and a half after all other signs of life had ceased, and these were the last movements that were observed.*

Such are the general phenomena that always follow the injection of the salts of soda into the veins; phenomena which are evidently the result of an affection of the nervous system, and which it now remains to connect with the local action which these substances have been found to exert on the pulmonary circulation.

The most ready explanation of these phenomena which presents itself, is, that they are owing to the compression which the brain must be subjected to by the accumulation of blood in the venous system, on the passage of this fluid through the lungs being arrested. In order to prove if this cause were sufficient to account for the phenomena, the following experiment was performed.

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* In the numerous experiments I have performed with this class of substances, I have always observed these respiratory movements to take place from one to two minutes after the apparent death of the animal. In some instances they have been the prelude to a partial recovery, if the quantity of the poison injected has not been too large, (as in Expt. 2); otherwise they have occurred when the other muscles of the body had permanently lost all power of motion.

Expt. 3.—A tube was inserted into the femoral vein of a dog, the tube being long enough to allow of the end of it penetrating to the abdominal cava. A solution of soda was injected into the jugular vein. Immediately before the injection of the poison, the pressure in the venous system was not sufficient to cause any appreciable difference in the level of the mercury in the instrument, but six seconds after the injection, the hemadynamometer indicated that the parietes of these vessels were submitted to a pressure equal to a column of mercury of two inches; a pressure which must also have been supported by the sinuses of the brain, and which must have subjected the whole of the encephalon to a degree of compression, quite sufficient to account for the appearance of the morbid phenomena.*

The action of these substances, however, is not confined to the capillaries in the lungs. The following experiment will show that the systemic capillaries are so affected, as to require the left ventricle to exert a force, three times greater than it employs in the general state of the circulation, before the blood containing these substances in any quantity, can pass from the arterial into the venous system.

Expt. 4.—A tube was inserted into the axillary artery, the point looking towards the heart, so that any injections that might be passed through it should enter the aorta, and thus become distributed throughout the body. The hemadynamometer was connected with the femoral artery, and the pressure in the arterial system was found to be equal to a column of mercury of from 4.5 to 6 inches. A solution, containing a drachm and a-half of nitrate of soda, was introduced into the axillary artery; about four seconds after the introduction of the first portion of the injection, and before the syringe was emptied, the pressure in the arterial system began to increase, and in sixteen seconds it was equal to a column of mercury of 14 inches. It remained at this height for a few seconds, and then gradually sank; the pulsations of the heart being finally arrested by asphyxia, all respiratory movements having ceased about ten seconds after the introduction of the salt into the veins. The presence of the salt in the blood did not appear to produce the slightest effect in destroying the irritability of the heart, a contrary action being evident; for the pulsations continued longer than usual after the arrest of the respiratory movements, the pressure in the arterial system being still equal to six inches, three minutes after the apparent death of the animal. The salts of soda, the action of which have been experimentally investigated, are the nitrate, sulphate, and carbonate. After the alkali itself, the nitrate is by far the most poisonous; a much greater quantity, either of the sulphate or carbonate being required to produce death, than of the nitrate; two drachms of which, dissolved in six drachms of water, are generally sufficient to arrest the pulmonary circulation, whilst from an ounce and a-half to two ounces of a saturated solution of either of the other salts, are required in order to produce this effect.

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* This explanation of the cause of the sudden death of the animal receives support by the effects that follow the introduction of nitric acid into the veins. This substance, by solidifying the blood, suddenly arrests the passage of this fluid from the right side of the heart, and thus produces a like degree of congestion in the venous system, which gives rise to phenomena exactly resembling those above detailed.

I shall now proceed to relate some experiments showing the action of the second class of substances, or those which appear to produce death by destroying the irritability of the heart.

Expt. 5.—A solution containing three grains of pure potass, in six drachms of water, was injected into the jugular vein of a dog, the hemadynamometer being connected with the femoral artery. The only effect produced was a slight quickening of the action of the heart, about twelve seconds after the introduction of the injection. A solution containing six grains of the alkali was then injected. Ten seconds after the injection had been pushed, the action of the heart became suddenly arrested, as was shown by the rapid fall of the column of mercury in the instrument, and the cessation of all oscillations. In a few seconds, the mercury in the instrument was at zero, and no oscillations, due to the action of the heart, were observed after the first cessation of its pulsations.*

The thorax was opened immediately after death, and the heart exposed in less than a minute after the last respiratory movement had taken place. The only sign of irritability it then manifested was a slight contraction of the right auricle. The parietes of the ventricles were perfectly motionless, nor could any contractions be produced by the application of the poles of a galvanic battery. Both the right and left cavities contained a considerable quantity of blood. The blood in the right side was dark and firmly coagulated; that in the left cavities was of a bright scarlet colour, and also firmly coagulated.†

Independently of the indications furnished by the hemadynamometer, these *post mortem* appearances furnish sufficient proof that this substance acts by destroying the irritability of the heart.

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* As the respiratory movements continue for some time after the action of the heart has ceased, care must be taken not to confound the oscillations produced in the column of mercury by these movements, with those arising from the action of the heart.

† The state of the blood after death affords a striking example of difference in the action of substances on this fluid, according as they are mixed with it whilst still forming part of the circulating fluid, or after it has been removed from the body.

The most striking proof, however, of the action of these substances on the heart, is furnished when they are injected into the veins of an animal, whose thorax has been previously opened, artificial respiration being performed. In these cases, the heart is *seen* to be suddenly paralyzed, in from seven to ten seconds after the introduction of the poison.

The salts of potass exert an action exactly analogous to that of the base. Experiments have been performed with the nitrate, sulphate, carbonate, and biarseniate. Of these salts the nitrate appears to be the most poisonous, the quantity required to arrest the action of the heart not exceeding five or six grains. On account of the striking analogy that prevails in the action of all the substances contained in this class, the above experiment will furnish an example of the effects that follow the introduction of any one of them into the veins. I shall therefore merely enumerate those, the action of which has been experimentally investigated. They are, nitrate of baryta, chloride of barium, ammonia, nitrate of ammonia, nitrate of lime, chloride of calcium, nitrate of magnesia, sulphate of magnesia. The effects of these salts when introduced into the arteries is shown by the following experiment.

Expt. 6.—A tube was introduced into the axillary artery (as in Expt. 4.) The hemadynamometer was connected with the femoral artery. A solution containing a drachm of nitrate of potass was injected into the axillary artery. Four seconds after the introduction of the first portion of the injection, the pressure in the arterial system began to be increased, and in seven seconds it was equal to a column of mercury of 14 inches. The column of mercury oscillated for some seconds between 10 and 14 inches. Thirty-five seconds after the injection, the action of the heart became suddenly arrested, and the pressure in the arterial system diminished rapidly. The thorax was immediately opened. Slight partial movements of the auricles and ventricles were still taking place, but no regular contraction of either of these cavities. The phenomena that this experiment presents, show that this salt, although it passes through the lungs with the greatest facility, yet exerts an action on the systemic capillaries analogous to that of the salts of soda. We have also a convincing proof, that the action of these substances on the heart cannot be owing to an effect produced on the nervous centres, for in the last experiment we find the poison circulating through the brain, and yet the left ventricle contracting under a pressure equal to six pounds on every square inch of its surface, the heart not being affected until sufficient time had elapsed for the blood containing the substance to pass through the whole of the vascular system, and to be circulated over its parietes.*

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* The time here given (thirty-five seconds), as occupied by the blood in passing

The general effects that follow the introduction of these substances into the veins are, as might be expected, such as result from the cessation of the action of the heart. As soon as the pulsations of this organ are arrested, the animal struggles violently, and the respiratory movements become deep, the animal appearing to suffer much. It is not until a minute or a half or two minutes after the cessation of the heart's action that the animal appears to lose its consciousness; and the respiratory movements often continue from two to three minutes after the circulation has ceased.

When a solution of these substances is injected into the arterial system, the general effects that follow are analogous to those produced by the introduction of the salts of soda into the arteries, and are probably due to the compression which the brain must be subjected to from the sudden increase of pressure on the arteries.

There is one general phenomenon that follows the introduction of the salts of baryta into the veins that I have not observed to be produced by any other substance, this is, the continuance of partial convulsive movements after death. These last from twenty minutes to half an hour, and are most marked in the anterior part of the body, probably on account of the salt being more readily diffused over these parts before the action of the heart is arrested.

I shall now endeavour to draw up a short resumé of the principal phenomena that have presented themselves in pursuing these investigations. The first fact that strikes us in a review of these experiments is, the connection that exists between the physiological action, and the chemical composition of these substances. This connection, however, is not such as our knowledge of ordinary chemical affinities would lead us to anticipate; for it is evident, that the decomposition produced by these salts in the blood, on which their physiological action depends, are entirely due to the base of the salt, being but slightly modified by the combination of this base, even with the most powerful acids. This fact is also in direct opposition to the conclusions we should deduce from an investigation of the action of these substances on blood, when extracted from the body; for, on mixing this fluid with solutions of different salts, the reaction that takes place, at least as far as a superficial analysis enables us to judge, are intimately connected with the nature of the acid which enters into the composition of the salt. I would cite one marked example of this, in the effect

through the systemic and pulmonary circulation, back into the aorta and through the coronary arteries, may appear much too short. It is, however, some seconds longer than the time generally occupied by the blood in completing the round of the circulation, owing to the obstruction which in this instance the fluid meets with in passing the systemic capillaries. For proofs of this rapidity of the circulation I would refer to a paper read before the Royal Society, in which I have brought forward a number of experiments on this subject.

of solutions of the nitrates of potass and soda on the blood, when mixed with it out of the body, both of which salts prevent the coagulation of the fibrin, although their physiological action is so different. A microscopical examination of the blood after its contact with these various salts did not in the least degree tend to elucidate the subject. Any attempt, therefore, to explain the physiological action of these substances, by the changes they produce in the composition of the blood, although a problem of the highest interest, is one, the solution of which is hopeless, until a more advanced state of chemical science shall enable us to detect the changes that the circulating fluid undergoes, from its contact with these foreign substances. There is one fact in connection with this point which is interesting, viz. that of all the salts, the action of which have been investigated, it is only those of soda, salts, which are found in considerable quantities in the blood, that do not appear to render this fluid incapable of continuing the irritability of the heart.

Although we are unable to detect the changes produced in the composition of the blood, it is evident that these changes must be of such a nature as to interfere with the reactions that are constantly taking place between this fluid and the tissues, and that thus the blood is unfitted to undergo those changes which are essential for the continuation of the functions of the tissue with which it is in contact. It would also appear, that those changes in the blood, which unfit it for maintaining the functions of one tissue in their normal state, may not render it incapable of undergoing those reactions, which are essential for the continuance of the functions of other tissues. Thus, the presence of soda in the blood, in any quantity, although powerfully affecting the pulmonary capillaries, does not so alter the composition of this fluid, as to prevent its undergoing those changes that are essential for the continuance of the irritability of the heart. The same remark will also apply to those changes which the salts of potass produce in the blood, by which the tissue of the systemic capillaries is violently affected, although the pulmonary capillaries do not appear to be acted upon.*

This local action of certain substances on different tissues, or different sets of capillaries, is a fact which admits of more extended application than the mere explanation of the action of poisons. I have no doubt but that a more extended series of experiments, and a close analysis of the facts they furnish, would lead to interesting results in explaining the *modus operandi* of many of our therapeutic agents. Before, however, any such anticipations can be realized, it is essential that we should possess a more accurate knowledge of the immediate changes which the blood undergoes by its contact with foreign substances—a problem of the highest interest to the physiologist, and the solution of which is becoming daily more practicable, from the rapid progress that organic chemistry is now making.

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* It is highly probable, also, that the action of those poisons which affect the nervous system, may be owing to certain changes they produce in the blood, which changes, whilst they do not interfere with the capillary tissues, or the heart, yet render this fluid unfit for undergoing those reactions which are essential for the continuation of the functions of the nervous tissue. In support of this opinion I would observe, that I have found that none of these poisons, however rapid their action, produce any general effects before the blood containing them has had time to circulate through the brain.

ART. IV.—*Practical Observations on the Diseases of Peru, described as they occur on the Coast and in the Sierra.* By ARCHIBALD SMITH, M. D. (Continued from Vol. liv. p. 19.)

I.—DISEASES OF THE COAST CONTINUED.

Diseases of the Abdominal Cavity—Fatiga.—I CANNOT enter upon an account of the various diseases to which the abdominal viscera are more particularly liable on the Coast of Peru, without trying to give the reader some idea of what is meant by *Fatiga.*

This expression is wide in its acceptation, and often used to signify a general feeling of uneasiness which attends certain disorders not referable by positive pain to any particular organ.

It is a common symptom during the hot stage of ague, and various disorders of the viscera, and seems to proceed from disturbance of the ganglionic system of nerves. There is hardly a female patient in Lima suffering under any disorder of the digestive organs but enumerates this sensation among the symptoms of her ailment.

Hearing *fatiga* so often mentioned by the sick, I endeavoured to ascertain what precise meaning was attached to it in particular cases. Some signify by the expression a feeling of oppression about the præcordia, accompanied with anxiety. Others say, that they mean by *fatiga* a peculiar sort of tightness at the chest, with shortness of breathing, like that which is experienced on stooping, running, or hurriedly ascending stairs. It is used very commonly, especially by ladies, to express a feeling of sinking, or of vacuity at stomach, often relieved by a cup of chicken-soup or chocolate. It is also employed to denote a sense of weight and weariness referred to the region of the stomach, attended with loathing of food, consequent, perhaps, on an old hepatic disorder, originally caused by the inward working of suppressed anger. This species of *fatiga* is said to be relieved, from time to time, by a few drops of laudanum.

It is a symptom of common dyspepsia, more or less aggravated when the stomach is distended with flatus. In the latter instance, the female patient imagines, that she experiences what is vulgarly called *a levantarse la madre*, or a rising of the womb, which produces the *fatiga*,—in other words, that it is an attack of hysterical globus.

Dyspepsia.—The process of digestion is usually very slow with the natives of the coast; and when in any degree indisposed, they are commonly cautious not to load the stomach afresh, whilst yet affected with flatulency or eructations, which is not unfrequently the case, for seven or eight hours after an ordinary meal. Indeed, one of the commonest signs of dyspepsia is that of which the natives so often complain, *eructando la comida hasta tarde*, viz. being troubled with eructation to a late hour after food. And among the most obvious causes of this affection is the general practice of using the cigar, and so creating an excessive secretion and ejection of the saliva, necessary for a healthy digestion.

A distinguished old Spaniard, for more than half a century resident in Lima, used to give the following rule for the enjoyment of health and longevity in that place. "To breakfast lightly, dine heartily, sup sparingly, and never break the night's rest."* This indeed may be a very good summary for Lima, where the people are generally cheerful and fond of amusement and sauntering,—circumstances which Cicero did not overlook when he inculcated that health required "concoctionem, vitationem lassitudinis, ambulationem moderatam, oblectationem, facilitatem alvi."

It is a prevalent belief in Lima, that men of letters in that climate are capable of very little literary labour without soon disturbing the organs of digestion. I once attended a person of spare form and pale countenance, who was habitually subject to dyspepsia. The disorder seemed to have been occasioned by a sedentary life, pensive disposition, and much dedication to reading. His feet were usually cold, and his digestion irregular, as was indicated by the varying quality of his stools, acid eructations, and flatulent movements in the bowels. If at any time he drank iced-water at dinner, or took a glass of cold water before the process of digestion in the stomach and duodenum was finished, that is, before five or six hours had elapsed after last meal, his bowels were sure to be disturbed in consequence; his head became heavy, and he felt drowsy. To avoid this disagreeable sense of weight and fulness, which gave him the idea of a rush of blood to the brain, he left off cold water entirely, and used with benefit tepid water for his ordinary drink.

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* His own words are "Almorzar poco; comer quanto queres; cenar lo menos que puedes; y no pasar mala noche."

I have known other dyspeptics of delicate constitution affected very much in the same manner. In this case, the affection of the head was more prominent than ordinary in those other instances in which we find that the general symptoms, and the effects of cold drink, are nearly the same.

Though it is a prevalent custom to drink iced-water at meals during the summer months, many delicate dyspeptics, like the individual just alluded to, cannot use it freely without suffering griping and other disturbances in the bowels, for which reason they prefer tepid water for common drink. With others, however, of a different fibre and temperament, cold drinks agree remarkably well during the warm weather, when the heat and irritability of the stomach are evidently greatest; and indeed many of them cannot digest well without the aid of ice.

It is a curious fact, connected with the local custom of using ice, that patients are met with whose powers of digestion are so feeble that the simplest chicken-soup or chicken-tea would sour on the stomach, unless this effect were prevented by cooling beverages. In some cases of chronic diarrhœa and dysentery, I have observed that the chicken-tea occasioned frequent and distressing calls to stool, when not restrained by the use of ice. This valuable remedy seems to impart tone or power, by lowering the morbid irritability of the stomach. From the Lima chalanes or jockeys, the new comer to a warm climate may take a lesson. They are remarkable for observing the different effects of cold and warm weather on the cattle under their care. In the cold and damp months they give their mules and horses grain with advantage; but in the heat of summer they withhold corn. They observe that grain, during the warm season on the coast, brings on a cutaneous eruption difficult to cure; and which is only removed by change of climate, or sending the animal to grass.

In illustration of the good effects on the human constitution of exchanging a stimulating mode of living, such as is fitted for a cold northern climate, for a more temperate regimen, better suited to a tropical one, I would adduce the following case.

An European in the prime of life, of a florid complexion, vigorous frame, and sanguine temperament, had once or twice suffered from acute hepatitis and bilious remittent fever; but, when in health, he never left off his wine, and was greatly addicted to strong coffee. Having so long indulged in these heating beverages, as he thought with sufficient moderation, because with perfect sobriety, he could not be persuaded by his family, which was Limenian, that the use of these articles could have any share in keeping up the habitual dyspeptic symptoms which he suffered. This affection was characterized by much flatulency, with such an inflated state of the belly as often rendered his widest vest too tight for him.

He had three loose stools daily. At length he was prevailed upon to make trial of a different regimen. He took no more hot suppers; he left off coffee and chocolate at night, and confined himself to a glass of iced-water before going to bed. At dinner, instead of his customary allowance of wine, he only drank a little Bourdeaux, mixed with plenty of water. The consequence of this new plan was, a cheerful mind, an easy stomach, and perfect health, with only one natural stool daily. I believe that this person's example might be often followed with no small advantage.

It may be remarked, that the beer of the country, which is made from Indian corn, and without the addition of hops, or bitter of any kind, sometimes procures a good digestion, when foreign beer or porter would be sure to have the contrary effect, and to render one bilious.

It is only among the dark races that spirituous liquors are much used; for, except in small quantities taken as drams at meals, they are, under all ordinary circumstances, considered to be contraindicated by the general influence of the climate. A spirituous purgative, for example, tincture of senna or rhubarb, usually irritates the stomach so much as to render it mostly always an improper remedy. Notwithstanding this peculiarity of operation in certain stimulants, others appear to be borne with comparative ease; for the stomach is daily excited by the excessive use of agi (pepper,) with little if any apparent inconvenience. But to this condiment, acting as a local cause, it may partly be owing that the papillæ of the tongue, especially near the root of the organ, are very often greatly elevated and enlarged in the natives.

An exceedingly irritable state of the stomach is sometimes discovered in delicate persons, without being accompanied with any unusual redness or morbid appearance of the tongue, though the gums may be spongy and ready to bleed on slight cause.

In many persons cutaneous efflorescences, or red blotches attended with troublesome itching, frequently manifest themselves when the ingesta happen to disagree with the stomach, or irritate the intestinal mucous membrane.

I have observed an instance wherein, after many months of continued relapses in case of quotidian or tertian ague, the irritability of stomach gradually increased until the utmost rigor of diet was indispensable. And after a plain and simple meal, though no pain or heat should be felt in the stomach, to which the stimulus was directly applied, the nose became red and hot, and the facial artery pulsated with increased fulness and strength.

A wine-glassful of undiluted wine would produce a similar effect. A teaspoonful of spirits could not be taken without giving rise to a disagreeable sense of heat at the throat and stomach. Epsom salts, dissolved in the infusion of cinchona, would sit easily, and act efficiently on the bowels, when other common evacuants caused increased irritation. No rich gelatinous soups, sweatmeats, or fresh pork in particular, could be eaten without affecting the face by sympathy.

It may be interesting for practical men to be informed, that all the above symptoms disappear almost at once on ascending the hill-land of Peru. In the interior the digestion becomes vigorous, the bowels natural, the irritability of the mucous membranes of the intestinal passages subsides, and the tone of the system is increased by moderate cold and regular exercise.

A visit to the Sierra, or interior of the country, is also a sovereign remedy for the most obstinate examples of hypochondriasis. In this gloomy infirmity the bracing air of the mountains, the excitement arising from the boldness and variety of the scenery, the feeling of danger by which a nervous person is frequently affected on the route, and the necessity of personal exertions on such a journey, have all a most beneficial tendency.

During some of the late campaigns in Peru, the delicate-looking sons of the coast were seen to return from a life of temporary hardihood among the hills, with all the characters of robust and vigorous health. By a change of climate, which can be easily effected in a few days, the most important and striking changes, physical as well as moral, may be accomplished; the weak may become strong, and the timid bold, as I have known in some most deplorable cases of hypochondriasis.

Xaqueca.—A kind of severe periodical headach, which is vulgarly called *Xaqueca,* is exceedingly frequent among the Lima women; and great numbers affected with it may be met with daily who have patches of some sort stuck on their temples by way of remedy. The xaqueca is commonly symptomatic of chronic disorder of the digestive functions, and it attacks with frequency women of a nervous habit of body, who are subject to congestion in the internal vessels of the abdomen.

When this distressing headach is connected with want of tone and vigour in the general system, or with dyspeptic symptoms of a nervous rather than inflammatory nature, decided advantage may be derived from keeping the bowels open, and giving for a longer or shorter time the carbonate of iron, which of all tonics I have found the best in this class of cases. But when connected with frequent indigestion and chronic visceral obstructions, I have seen the xaqueca relieved by a profuse and spontaneous hæmorrhoidal discharge, or by a deobstruent course of medicine calculated to correct the existing structural derangement.

Vomiting.—Of the various painful symptoms connected with deranged digestion, vomiting is one of the most prominent among the Limenese. It is sometimes attendant upon a highly irritable or chronically inflamed state of the mucous membrane of the stomach or intestines; sometimes it arises from mental emotion, or diseases in remote parts, which only affect the stomach sympathetically. At one time this symptomatic, but frequent and distressing affection, is kept up by structural, at another time by functional disease.

In order to illustrate its mode of appearance, and the sources from which it arises, I subjoin a few examples from my diary.

1. A young man in good health, having overheated himself by walkingon a warm summer's morning, quenched his thirst by drinking iced-water. He had scarcely advanced two squares, or two hundred yards, from the place where he drank the water,—that is, from the Palace Square to the Calle de San Jose,—when he was seized with giddiness, followed by violent headach, with redness of the eyes, and incapacity to stand or even sit up. He felt quite sick at stomach, and vomited the food which he had taken two or three hours before. He now drank warm water freely to favour the action of vomiting, by which he was so entirely relieved, that soon afterwards he made a good dinner.

2. A young girl, who had hardly attained maturity of form, was married to a young man who followed the lucrative occupation of baker in Lima; and, to indulge her in her childish inclinations, he allowed her to eat what they call *Antojos*, or fancy-dishes. One evening she regaled herself with sweetmeats and *mani*, or ground nuts, until she became what they call *empachada*, or surfeited. Shortly afterwards being excited to anger, she was seized with pain in the belly, some fever, and vomiting of green and yellow bile. No aliment except arrow-root or panada would remain on the stomach. *Caldo*, which is the name for mutton, chicken, or beef-tea, &c., especially disagreed with her, and was vomited as soon as it was taken. Upon the administration of an enema of milk and water, the vomiting ceased, and she speedily recovered.

3. In warm weather, a young woman, shortly after rising at her usual hour in the morning, and apparently in good health, was seized with bilious vomiting, which was induced by no assignable cause, and she also complained of great oppression or fatiga at stomach. She requested the aid of a physician, who prescribed a little gum-water with ice, to be taken every half hour. But, not being relieved by this, she consulted another, who ordered her one grain of opium in a bolus of conserve of roses. By this means the violent vomiting was restrained, and the cure was completed by iced-rice water.

4. A stout young man was suddenly seized with indigestion and vomiting after violent exercise. The vomiting was most distressing and almost incessant, attended with a convulsive agitation of

the whole frame. Various external applications were resorted to in vain; nor did ice-water and effervescing draughts afford the least relief. Æther with laudanum in large doses proved equally unavailing; but all the symptoms very quickly yielded to a scruple dose of calomel, combined with one grain of opium.

5. A robust young man went to bed at his usual hour, and in his usual good health, in the warm month of February, after having drank, an hour or two previously, a cooling beverage, which consisted of lemon-juice, water and syrup, with ice. He awoke at midnight, and had a sudden attack of vomiting; and afterwards for many hours the vomiting was attended with excruciating pain at the stomach and navel. The vomiting occurred every five or ten minutes; each attack being followed by an interval of rest, accompanied with a feeling of exhaustion; after which the pain returned, and the vomiting was renewed. The face was flushed; the surface was covered with general and incessant perspiration; the pulse was full and frequent; and the tongue clean and natural. The patient could not say whether or not on the first invasion he had rejected any undigested food; but he expressed his surprise that what he had vomited was neither bitter nor disagreeable to the taste.

I was called to see him about ten o'clock in the forenoon, when I learnt the facts of his case now mentioned. The symptoms had not yet much abated in their violence; and, under the circumstances, I thought it advisable to give him a dose of eighteen grains of calomel, mixed with a little gum arabic, which he took in common syrup, washed down with a few mouthfuls of plain water. Two hours after he drank a glassful of linseed water.

From the time he took the calomel the vomiting entirely ceased, and hardly any pain or disturbance in the bowels remained. The patient then became tranquil, and slept most of the afternoon. His bowels were not opened until the following morning, when he was quite recovered, and voided a moderate, consistent, and dark-coloured stool.

6. In cases of chronic gastritis, attended with frequent retching and vomiting of everything taken by the mouth, I have known ice, which the patients chew with avidity, afford more relief than any other remedy, enabling the stomach to retain a spoonful or two of panada seasoned with some vegetable acid.

For diseases of this nature, not uncommon on the coast, cupping is less frequently resorted to in Lima than the interests of the sick require, in a place where leeches are extremely scarce. Blisters, sinapisms, embrocations, cataplasms, warm baths, anodynes, and clysters in abundance, are usually applied in native practice, and frequently without much benefit. When all such ordinary resources have proved fruitless, it is sometimes discovered that the gastric disorder is kept up by sympathy between the stomach and some other organ in an unhealthy state; for example, an indurated and enlarged ovary, or uterus in a state of inflammation more or less acute. I well remember an instance of this latter nature, which was pronounced to be hopeless, and in which the patient was piously consigned, by a well-known native practitioner, to the care of the priest and confessor. But from this master's unpalatable opinion she appealed to a consultation, at which I attended. She was now directed to take small doses of calomel in conjunction with opium, morning and evening, aided by mercurial inunction, until the salivary organs should become mildly affected. When this object was attained, the irritability of the stomach was so far removed that drink and farinaceous food could be comfortably retained, and by diluents and laxatives the cure was in a great measure completed, and the woman restored to the enjoyment of health, though the uterine enlargement was not entirely removed.

7. A young lady was confined to bed for three months, affected with obstinate costiveness and almost continual vomiting of green vitiated bile. Her complaint had originated in winter weather, and appeared in form of what she termed a bilious colic, which was soon followed, according to the statement, by symptoms of general inflammation in the bowels. These inflammatory symptoms had afterwards disappeared, but the costiveness and vomiting continued. Frequent warm baths, as well as opiates and iced-drinks, proved unserviceable, and nothing was found to relieve her. The case grew tedious. Many doctors were consulted, and at length it came to my turn to be called. I recommended the application of a large sinapism to the abdomen, to be followed by an enema, consisting of one drachm of ipecacuan powder in form of infusion, being administered, powder and all, with an addition of two table-spoonfuls of olive oil, and one of molasses. This compound opened the bowels freely, carrying off thin, yellow, and copious feculent motions; and the complete solution of a painful and protracted malady was the consequence. The patient rapidly convalesced; but was very attentive to the quantity and quality of her diet for some time.

I may remark that in this case the enema employed appears to have stopped the vomiting chiefly by the revulsion it occasioned, just as at other times we see that an emetic dose of the same powder suspends or removes a troublesome diarrhœa.

8. I have met with some instances of periodical vomiting, arising at a certain stage of the process of digestion, and attended with, or preceded by, pain more or less acute.

In such cases the appetite may be good enough; but a few hours after food is taken, that is in about from three to five hours, there comes on a severe colic, followed by vomiting; and at length a portion of fetid and half-digested matter is brought up with much effort; giving the individual affected relief till after eating again, when he has again to go through the same course of suffering.

I particularly remember two examples of this kind of severe gastrodynia. One took place in a young man a good deal addicted to the use of ardent spirits, and the other in an elderly person, of a choleric temperament, and much exposed to the sun in his daily agricultural pursuits. In neither case could any abdominal tumour or induration be detected by external examination. Both subjects consulted various physicians, and were led to use many different drugs, finding none that was efficient; and both at last, after long illness, were cured by bathing in the sea during the summer season.

9. It may be curious to mention that a white woman, residing in Lima, and in the middle ranks of life, was accustomed to have two dinners prepared for herself daily. The first dinner was a sumptuous one, abounding in all the rich varieties of the season. Of this she partook very freely as a luxury; but shortly afterwards, this preliminary repast was wholly rejected by the aid of draughts of warm water; and, when the stomach had recovered a state of repose, she eat her second or plain dinner, which served to nourish and support her very corpulent frame.

Such a debility of stomach as the following case exhibits is not common.

10. A foreigner, who had resided in Lima for many years, complained of weakness at stomach, indicated by vomiting his food, with some slight uneasiness, very soon after taking it. This gentleman could not perspire, and the radical disease under which he suffered was supposed to be seated in the liver. Though he passed the winter in Chorillos on account of its milder climate, and took sufficient daily exercise in riding to and from Lima, yet his skin continued dry and stomach weak. When in good health he perspired freely, and he therefore thought that a voyage to Guayaquil might do him good, by restoring the naturally perspirable state of the surface. He embarked, and before he got to his destination, the skin became relaxed, and he felt better. So rapid was his recovery that, as he avers, on the very first day of his arrival in Guayaquil, he eat three hundred of the small oysters which adhere to the leaves of the mangroves that dip in the river of this city. After this feat he had no more ailment of any kind; the functions of the skin, and also of the stomach and intestines, became perfectly healthy and natural.

Gastric and Intestinal Hæmorrhage.—The climate of Lima, and of the coast of Peru generally, is observed to induce among the inhabitants of those regions, a peculiarly weak and lax state of the gastric and intestinal tissues, as well as of the capillary vessels connected with them, which subjects these parts to frequent, though rarely fatal, sanguineous discharges consequent on various causes of local irritation.

The following examples may serve to show how such disorders usually appear; and are commonly connected with deranged digestion, though not always with organic disease.

Ex. 1.—A little girl, 3 or 4 years old, of Spanish parentage and fair delicate skin, being in her usual health, was put into the cold bath; felt chilled in it; was soon taken out, and shortly after voided one copious stool of dark blood. Next day she was affected with prickly heat; and without further trouble, or the use of medicine, her bowels, as now indicated by healthy alvine motions, recovered their natural condition.

Ex. 2.—A brown or Zamba slave girl, about 10 years of age, had no appetite, and felt dull and heavy for several days. The lady whose property she was gave her a dose of manna, which did not operate much, if indeed at all, as a purgative. But soon after it was taken the girl vomited some blood; and then, as if by a charm, her spirits returned, and she was quite well.

Ex. 3.—A military officer, worn down by arduous service, and the want of regular rest, was attacked with tertian. His bowels having been previously relieved in some degree by emollient ptisans and clysters, according to the fashion of the female attendants of the country, the physician who was called recommended a simple infusion of bark, alternated at the proper medicinal hours with low diet. This treatment was attended with vomiting of blood and discharge of blood from the bowels; the blood voided by stool being dark in appearance, more or less clotted, and very fetid. I first saw the patient when in this state, and ordered that the bark should be discontinued. He was now put on a thin arrowroot diet, with linseed and mallow-water for ordinary drink. The belly was anointed with oil and covered with flannel, with a view to keep up an equable circulation, and a starch enema was administered once a-day. Under this treatment, the tertian was very slight at the next corresponding period; and after it had terminated, the usual gentle purgative of the Limenian practitioners was resorted to; namely, a dose of manna dissolved in tepid whey. By this means the bowels were opened freely, and the stools assumed a natural appearance. All the bad symptoms now disappeared; and in two or three days more, under good nursing and attention to regimen, he was perfectly convalescent.

Ex. 4.—An elderly lady, who enjoyed general good health while she only eat what she knew would agree with her, was sure to be seized with discharge of blood from the bowels as soon as she happened to eat anything that she could not easily digest, or what too much irritated the duodenal or general intestinal mucous membrane; thus illustrating the old observation, *ubi stimulus, ibi fluxus.*

This sort of case is not of rare occurrence among the people of Lima; but those who are occasionally affected in this manner commonly recover from the ailment without the aid of the physician. They habitually resort to such simple domestic remedies as an emollient enema, anointing the belly with almond oil, and drinking liberally of a ptisan, which is composed of mallow, linseed, and rose water, with the addition of a little sugar or any simple syrup.

Ex. 5.—A stout, active, and middle-aged bronzed woman, sat down to breakfast in her usual good health, and eat of boiled Indian corn half ripe and in ear, *(choclo,) tamal*, or pork baked with bruised maize (usually enveloped in a piece of plantain leaf), *camotes*, or sweet potatos, several hard eggs with fresh curd, and a fair allowance of chocolate, besides. An hour after this, as she conceived, most simple repast, she washed her body with cold water, which soon induced chills and shivering, with a general feeling of indisposition and pain in the belly. These symptoms were followed by a feeling of constriction and irritation at the arms, and there now came on evacuations of pure blood mixed with bile. Under these circumstances she resolved upon an act of self-denial, viz. to eat no more that day. She diluted what she had eat to breakfast, by repeatedly, in the course of the day, drinking freely of linseed water sweetened with syrup of roses; and the result was, that on the following morning she rose perfectly well.

Ex. 6.—A gentleman, well advanced in life, and long affected with chronic hepatitis, was directed to take a dose of manna in oil, the favourite purgative *orchata* of the old doctors of Lima; and on the night of the same day on which he took this savoury potion, he was seized with hæmatemesis. A physician was instantly sent for, who, finding that ice, a popular remedy in such cases, was not at hand, prescribed an anodyne draught with twenty-five drops of laudanum. This dose the stomach rejected, and therefore the same quantity of the opiate was again repeated, and he passed the remainder of the night quietly.

Next morning a consultation of two native physicians was called. They determined that the patient should be bled* in the forenoon; and in the evening he was put into the warm bath by their direction. The unfortunate gentleman was no sooner taken out of the bath, which had probably induced a fatal internal hemorrhage, than he became as cold as the grave, and expired.

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* A bleeding in Lima seldom exceeds 12 or 16 ounces when ordered by native practitioners. They are fond of smaller bleedings, frequently repeated, in the common inflammatory disorders of the country.

Ex. 7.—A young Englishman, who had been for some time a visitor in one of the great commercial houses in Lima, was seized with discharges of blood from the bowels. The case became one of consultation; and I was one of the physicians consulted. We learned from the account of his former medical attendant, Mr Kidstone of Lima, that the young gentleman's attack had been of hepatic origin, but found from his actual state that ulceration had probably taken place in the alimentary canal. Hence vessels of considerable size appeared to have been laid open; for the blood which was passed by stool, from being dark and grumous, became florid and arterialized in appearance.

After many profuse and clotted discharges of blood, repeated from day to day, the intestinal hæmorrhage at length became still more alarming. Exhaustion with faintishness ensued; and the consequence was that the hæmorrhage naturally ceased. Now the patient confined himself rigidly to milk alone, as his only drink and nutriment. There was no longer any appearance of blood in the stools, and convalescence went on uninterruptedly. While on the milk diet he daily evacuated large pieces of curd, which, however, did not seem to occasion irritation in the bowels. He embarked for Europe, and arrived safely in England.

Ex. 8.—A clever woman, intrusted with the management of the commercial affairs of her husband, is habitually troubled with a hæmorrhoidal discharge, and frequently exposed to many sources of mental annoyance. Though a person of a cheerful and most charitable disposition, yet such is the prevailing influence of the depressing emotions over the digestive functions in her case, that she never experiences molestation in mind without its being attended, or quickly followed, by corresponding bodily indisposition.

Having on one occasion been irritated and put out of temper, and consequently seized with an attack of colic, attended with much flatus in the bowels, I was sent for. She felt great drowsiness and heaviness about the head, with a tendency to fall into a state of insensibility.

After the attack had thus commenced, the patient had intervals of respite; but the disease recurred in fits attended with severe colic pain; strong chattering of the teeth; general convulsive motions, and particular contortions of the face. These paroxysms did not continue long at a time, but were followed by short intervals of quietude and stillness, though not of insensibility.

As she recovered from these fits, under the administration of blood-letting and opium, incredible quantities of dark coagulated blood were voided *per anum.* Uneasiness was felt at the region of the liver, and colic pains attended the sanguineous stools. The mildest laxatives and emollient enemata were resorted to; and sinapisms or blisters were applied to the abdomen, without in any degree removing the intestinal local irritation and pains, or the existing hæmorrhagic discharges.

Ice, the usual remedy, and iced acidulated drinks, failed to afford that relief which at length was happily derived from pills of opium combined with a small portion of acetate of lead. This efficacious remedy speedily checked the inordinate intestinal hemorrhages, in which there was often no appearance of fæcal matter. After a few days' rest, the patient was removed to Chorillos, in a very weak and reduced state; but she made a very favourable recovery.

A year or two after this attack, she had another equally severe, in all respects, excepting the intestinal hemorrhage, which was merely hæmorrhoidal and moderate in quantity. But on this latter occasion, the liver was unusually sensible when pressed upon, as was also the spleen, though in a less degree, and, indeed, the whole abdomen was somewhat tender and impatient of pressure.

A dose of castor oil with twenty drops of laudanum, aided by emollient clysters, served to quiet irritation and freely open the bowels; by which means the attack, with all its lethargic and convulsive symptoms, was removed. She was now put under a mild mercurial course, which, by correcting hepatic disorder, afforded great relief from the habitual hemorrhoidal affection, and likewise from colic uneasiness, and frequent *xaquecas*, or periodical headachs, to which she had long been subject, and which were always sure to come on after any painful mental excitement.

I may remark, that for the *xaquecas* or headachs to which this lady was subject, *ayudas* or clysters, and iced-drinks were her almost daily and familiar remedies, when in any degree threatened by these molestations. In most cases these means, with a thin farinaceous diet, and occasional warm-baths, afforded her a temporary respite. This line of treatment was not peculiar, but is that usually resorted to by the Limenese, in the generality of the *xaquecas* to which I formerly alluded as symptomatic of disorders of the digestive organs.

I have known, however, iced beverages not to accord with persons addicted to drink much ardent spirits, when affected by intestinal irritation or hemorrhage.

I should not fail to mention in this place that hæmorrhoids are so common in Lima, even among those who present to our observation no palpable visceral obstructions, that as an ailment, they are little thought of until from costiveness, cold, long rides, or over-exertion, &c. they become inflamed. While they do not cause much uneasiness, persons habitually troubled with them think little of voiding blood with their stools; and this blood, they vulgarly imagine, descends from the scapulary region. They call it *sangre de espaldas*, a kind of generic name, not confined to the discharge from piles, but applied, as well, to other more formidable discharges of blood from the intestines.

I have met with innumerable instances where this sort of sanguineous drain was habitual, and sometimes copious, without producing any appreciable weakening effects, or injuring, upon the whole, the general health.

We sometimes find the heart very strongly though only sympathetically affected in cases of intestinal hæmorrhage, of which I would relate the following as a striking instance. A middle aged gentleman, of a full habit of body and pale countenance, was subject for several years to frequent as well as abundant discharges of blood from the bowels. He was an ardent politician, and easily agitated by the operation of mental emotions. When walking in the street, a feeling of approaching syncope, but without actual fainting, was readily induced, even in his ordinary state of health; and when the vessels happened to be overloaded, and the pulse was full,—as in those states of local congestion that immediately preceded the periodical discharges of blood from the bowels, any mental disquiet or excitement was sufficient to occasion the peculiar feeling of oppression called *fatiga*, and a violent palpitation of the heart, attended by pain shooting across to the left and sometimes into the right arm; thus simulating, or realizing a paroxysm of *angina pectoris.*

This gentleman had been often bled for these attacks, but experience showed that bleeding could only afford temporary relief; for the disorder was probably sustained by a general plethora. The local congestion and consequent intestinal hæmorrhage appeared to originate from the peculiar influence of disagreeable emotions or strong passions, in causing accumulations of blood in the abdominal vessels. Low diet, open bowels, and living in the country, removed from scenes of political intrigue, and great occasions of mental excitement, were chiefly the means that afforded this patient some alleviation under so protracted and distressing a disease, of which I know not the final result.

The following case, though foreign to the general subject of gastric or intestinal hæmorrhage, it may be worth while to introduce here, as not only manifesting the influence of the mind over the action of the intestines, but also on the uterine system.

A remarkably stout, active, and ruddy complexioned Limena, who had borne several stout boys, and owed much of her unusually robust constitution to her ordinary occupation of superintending a dairy, was one day on a visit in a house, where the conversation started happened to be disagreeable to her; the consequence was, that she almost immediately felt a call to stool, and had to retire. This took place at an early hour after dinner, when the food was still crude and undigested in the stomach, and, therefore, she drank a glass of water, and, by way of precaution, betook herself to bed.

When she awoke next day, she felt something suddenly give way within her, and then there came a strong gush of blood *per vaginam*, which she partly stopped by drinking iced-water, and applying to the loins cloths dipped in vinegar and cold water. She was at this time in a pregnant state; but, notwithstanding, after this sudden attack of hemorrhage, she experienced several irregularities in what she considered to be the catamenial discharge; and being also apprehensive lest she should have suffered some serious damage inwardly, she consulted a physician regarding the nature of her case, and the propriety of sea-bathing. He told her that, if she were rash enough to try the sea-bathing, the inevitable consequence would be abortion. The patient, however, followed her own counsel. She went to the sea-port of Callao; and her health and appetite were improved by the bracing effects of the sea-bathing.

Empacho. (*Impactio*, Lat. Constipation.)—Under the title of *empacho*, I do not mean to describe any new disease peculiar to Peru; but I here use this term, which admits of a double acceptation, in preference to costiveness, with a view to familiarize my readers with a native expression in constant use; and referring to an assemblage of symptoms which, in some shape or other, is vulgarly supposed to be connected with almost every form and modification of gastric or intestinal disorder, to which the inhabitants of Lima more especially are subject.

The word *empacho*, then, is generally used in two distinct senses, which require to be explained.

In the one instance, it is employed to denote an unnatural collection of alvine sordes, or an excessive accumulation of fecal matter in the bowels; in the other case, it signifies a casual lodgement in some part of the alimentary canal of any undigestible matter, such as the coriaceous portion of a fig, grape, or date, keeping up irritation, and probably inducing diarrhœa. The former example is in vulgar language called simply *empacho;* the latter is *empacho pegado*, or adherent *empacho.*

It is only of the first of these affections that I mean to offer some account in this place. But for the popular prejudices of the Limenese connected with their notions on the subject of the *empacho*, I may refer to what I have written elsewhere regarding this and other vulgar prejudices.*

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* See Peru as it is, Vol. i. p. 56.

A torpid state of the bowels, though not at all so prevalent (except in the aged,) as its opposite extreme, diarrhœa, is frequent and troublesome; but is not always reckoned a disease among the sedentary portion of the Limenians, who often require the help of the *Xeringa* or clyster, as an indispensable means of relief.

We can imagine that a costive habit may be acquired by eating much more than is necessary for nutriment or easy digestion; and in Lima those who do not always consult solidity in quality, often make up for it in quantity. When the tone of the intestines is once diminished, the habit of costiveness is easily formed; and each renewed distension of the colon and rectum renders them more disposed to become the passive receptacles of undue fecal deposit. I have seen the rectum so distended even in a child, by an immense accumulation of hard and impacted feces, as to have lost its natural power of contraction, when no agent less active than an enema with croton oil was required to procure relief.

Such a statement as the following is sometimes heard from a person of a costive habit. "It is only at the expiration of many days, and with much trouble, and the help of clysters, that I am relieved in my bowels. When after a succession of days eating but not evacuating, the intestines become thoroughly stuffed, (*atorados*,) I feel no longer any appetite for food; and then come colic and vomiting, and I am not relieved until the belly be freely opened." This state constitutes what is called by the native physicians *a stercoraceous empacho*, (Lat. *Impactio*; obstruction); and the patient has probably been so long inured to stimulate the rectum by clysters, that he finds the great intestines, though distended like a sausage, no longer obedient to these ordinary assistants; and, therefore, he comes to the doctor for a purgative which gives temporary ease; but when once freed from the troublesome burden by the active operation of castor oil or some such remedy, the person goes away and eats as before, until the bowels are again so well stuffed, that no more can be eaten till the bowels have been emptied by the renewed employment of the remedy.

It is not unusual to hear complaints concerning the stercoraceous repletion or empacho in old persons, from which, at the end of four or five days, perhaps they are partially relieved by voiding with uneasiness a hard scanty motion; and twice or thrice in every month, one so molested may have a day of looseness in the bowels or a kind of salutary flux, consisting of hardened or perhaps scybalous feces, mixed with a portion of liquid discharge, and is consequently left at rest for several days after.

I visited an old Indian troubled with this sort of habitual costiveness and occasional diarrhœa, in whom the heart was affected and the liver vastly enlarged; and when the fecal accumulation was not timeously removed by physic or clysters, he used to complain of "una fatiga de la muerte"—a death-like oppression about the stomach and heart. And I observed in the same individual in whom the occasional returns of diarrhœa were preceded by external coldness of the extremities and entire body, that the preternatural palpitation at the heart went on increasing for months, until at length it became violently fluttering, when all the great arterial trunks in the thoracic cavity seemed to have shared in the same struggle and irregular action before death:—in which the complicated infirmity of the old man, after many alternate alleviations and aggravations of symptoms, at length ended.

The following case, as it occurred in his own person, was one day related to me by an aged Lima practitioner, who consulted me on the best way of treating his ailments.

"For many months I have been ailing, and they treated my case as an aneurism, with ice and vinegar, &c., because they found that in the abdomen between the stomach and navel, a great elevation or tumour with strong palpitation had been formed. But observing that I neither perspired, expectorated, nor exonerated the belly, I resolved upon taking a dose of manna in whey, by which I voided very large and long-detained feces, and thus the elevation or tumour decreased. But I fear that, with all the ice and vinegar I was made to use for the supposed aneurism, some of my viscera have become obstructed. The tepid baths only relax my bowels so as to fill them with air, that has no exit downwards, and moves about in the bowels, and so distends them, that there is no relief without a purgative. When I do not take the manna I have no passage in my bowels; and when the belly is bound the tumour supposed to have been aneurismal, becomes quite elevated, with a rumbling of air in the intestines, and attended with flatulent eructations, and a jumping motion—'*salto*'—or palpitation, which always ceases when the bowels are evacuated. So you see, Sir, they were all mistaken who said that my disease was aneurism."

In this instance, the tumour, which had long continued stationary in the transverse arch of the colon, where it was moved by the strong palpitation underneath, until dislodged by the manna, gave rise to the erroneous notion of an internal aneurism. Such a mistake I have known several practitioners to have fallen into on other occasions as well as this; and the distension of the colon, as happened in the above case, from fecal detention and flatus, I have witnessed in other instances attended with *pyrexia*, and confounded with acute *hepatitis* and enlarged liver, till a dose of salts and senna, or some other suitable purgative, dissipated the tumour, and with it the physician's delusion.

Strong but not constant palpitation of the abdominal aorta and its chief branches is a common sympathetic affection, and I have known it arise in a man whose general health was good, in consequence of eating a bit of chicken, before the slight irritation or excitement induced in the *primæ viæ* by an ordinary dose of a purgative medicine, had entirely subsided.

Colic.—This is a common complaint among young and old, as a consequence of irregularities in diet, in a country where great watchfulness in diet is every day essential for the preservation of general health.

Those who are more remarkably liable to be attacked with colic, during the cloudy and wet season in Lima, are the Serranos, or inhabitants of the hills, who come to the coast at this time to trade; while on the hills it is the dry season, and the roads are hard and passable for mules and cargoes, and the weather such as to offer no risk of damage to goods, from swollen rivers, rain or snow storms, &c. The colics of such persons who usually put up in the " tambos," or inns frequented by muleteers and traders, are often brought on by eating olives, pears, and similar articles, to which they are not accustomed at home, and may in general be removed by a dose of castor oil, with twenty drops of laudanum, or by an opiate pill followed by one or two purgative clysters. But during the hot months, when, from the effects of increased solar heat, the excitability of the system, and especially of the gastric organs is proportionably augmented, we have frequent occasion to witness among the regular residents in town, most severe cases of colic, very likely induced by eating curd with molasses, (of which the lower orders are very fond,) or an ordinary sweet-cake, prepared of coarse sugar, called chancaca, studded with " mani" or ground-nuts. But the most common exciting cause of all at this season is the great consumption of melons, and of the fruit called pepino, vulgarly Mata-Serrano or mountaineer-killer, which are considered very usual causes of fevers, colics, cholera, and diarrhoea. About vintage time in Ica, the Indians from the interior are known to suffer severely from such ailments, when they visit that part of the coast, from the great relish with which they eat the melon and half ripe grape. I shall now give a few particular illustrations of colic.

1. In Lima when the men are sick the women usually are *relatores*, or narrators of their case; but when they are themselves ailing, sometimes the men become narrators in turn. Thus, one man standing by the patient's bed-side, said to me, when desiring to account for a severe colic, " My wife is very choleric. For a bilious movement she had experienced she took iced pine-juice, and it agreed with her perfectly. On the day following she took iced milk, and it caused a most severe colic, from which she still suffers." This case required a purgative; and one of manna and rhubarb in an infusion of senna, afforded relief.

2. Another man related of his wife:—She is very choleric; she frets without provocation, and the result is a fearful colic that would soon kill her, if she did not take care to drink warm water, and so produce vomiting; for as soon as she becomes choleric, the food on her stomach ceases to be digested, and becomes corrupt. Hence, at whatever hour, by day or night, she happens to be angry or peevish, she herself, to avoid a violent colic, instantly drinks warm water, by the aid of which she vomits and is quite well again.

3. A middle-aged lady, of stout form, but nervous temperament, for some time subject to colic complaints, exceeded at supper in eating pease and rice. And next morning she sent for me, and related her own case thus:—"Over night I was seized as if it were with *lipyria*. I had violent pains in the belly, acid eructations and retching, but no actual vomiting. At the pit of the stomach I had a most violent palpitation, and so great a *fatiga*, that I looked for death; but at length evacuations came on, which carried off the rice as entire as I had eat it. Now I am at ease, and in course of the night I was visited by the catamenia."

4. A respectable white woman, of a nervous habit of body, experienced in the morning, of a day in February, some annoyance that ruffled her temper: at four in the afternoon she dined, and by way of desert after a simple meal, eat curd with honey or molasses—"*requeson con miel.*" Having finished dinner, she was again put out of temper, and from five to six in the evening, or about an hour after dinner, a vehement pain fixed itself at the seat of the stomach, from whence it soon extended to both sides in the line of the lower ribs, towards the loins, and to all the abdomen. The arms, to her sensations, became as hot as fire; the neck stiff and uneasy, and the head stupefied. Nausea and flatulency, followed by some vomiting of bitter matter, came on about seven o'clock at night, and immediately she drank warm water freely, by the aid of which she rejected curd, and all her dinner, so that she thus was relieved of her colic or cramp in the stomach, and, feeling exhausted, she slept for a little after.

During her conflict with the disease, her attendants anointed the abdomen with almond oil, and administered a couple of clysters of linseed water, which returned, carrying off very little feculent matter.* After her short sleep, she awoke in a state of moderate reaction, and she now observed quietude of mind and body; used spare farinaceous food, and drank whey mixed with linseed water, till two days after the attack, when feeling only a sense of oppression at stomach, she took, with great benefit, iced pine juice to complete her cure.

5. In the ordinary and regular colic, neither attended with, nor ending in vomiting or evacuations, after the severe pains, unaccompanied with fever, felt about the umbilical region, had lasted a while, say several hours or a whole night, I have known the symptoms become rapidly inflammatory, so as to affect the general circulation, and give rise to a febrile state of the pulse. Blood-letting,

followed by the warm bath, sinapisms to the belly, and efficient purgative medicines, aided by an emollient clyster, are in such cases approved means, which serve, in general, to arrest the progress of the disease ; and the remaining irritation and tenderness may be removed by employing panada, diluent drinks, and the favourite *agua de pollo*, or chicken tea ; not omitting the usual unctuous applications to the belly, which, after being anointed, the natives cover over with the warm omentum or caul, *redano*, of a sheep or pig.

6. But when this intense and inflammatory sort of colic is neglected in its origin, it may terminate in *iliac passion*, or what is commonly called

Colico-Miserere.—This formidable disease, which is sometimes occasioned by an *empacho* from eating cheese, like other affections attended with vomiting, the old native practitioners attack with iced-drinks and cold enemata ; and I believe that the latter especially may often be of service, where the former would be objectionable. Thus, I have considered the iced-drink contraindicated whenever I found it ordered to a patient with an habitual enlargement of the liver and spleen sympathizing with the inflamed intestine, and passing quickly from the chronic to the acute state of morbid action, and irritated more and more by every repetition of vomiting, or straining and retching.

We are, however, fortunately not without a remedy which, if applied after the timely use of the lancet, may be considered, I think, less exceptionable in such cases than *ice* can be. This is calomel in a full dose of from sixteen to twenty grains, alone or with opium, for an adult. The existing prejudice in Lima against the seasonable use of this remedy is still great, and I never saw it employed in the cases of iliac passion that I have known, from time to time, occur there.

Of the valuable sedative effects of this remedy, Sydenham, though perhaps unwittingly, has handed to posterity a practical lesson in his treatment of a case of iliac passion, recorded in his *schedula monitoria de novæ febris ingressu.* When the violent irritation of the bowels did not yield to an enema of tobacco smoke,[*] he prescribed as a cathartic somewhat more efficient. *Pil. ex duobis*, gr. xxiv. ; *mercur. dulc.* scrupul. i. made into pills, and to be taken in a spoonful of syrup of violets ; at the same time the patient was enjoined to drink nothing, lest the pills should be rejected. Modern experience shows that sixteen or twenty grains of calomel, when given alone at a single dose, are well calculated to allay vomiting or gastric and intestinal irritation, while the other ingredients in Sydenham's prescription, of which the *pil. ex duobis* consist, (viz. colocynth and scammony,) never, I think, could, without the aid of a sedative of some sort, be made to sit quietly on the stomach in cases of high excitement, pain, and vomiting, such as Sydenham so graphically describes.

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[*] Tobacco smoke seems to prove cathartic or laxative by removing constriction :—*for* of the very remarkable power which tobacco infusion of even moderate strength (say ten or twelve grains infused for ten minutes in six or eight ounces of boiling water,) possesses, of producing, when injected into the rectum, muscular relaxation and general depression, every surgeon has evidence in cases of incarcerated hernia.

Cholera.—This disease, which occurs on the coast of Peru at all seasons, is a very prevalent one in Lima during the warmer summer months, when the languor and debility of the muscular system is increased, and when the digestive organs and nervous system are most irritable and susceptible. In Ica, which is a vine district from fifty to sixty leagues to the south of Lima, cholera is a well known disease, but not so formidable as the variety of the same which appears especially in Palpa, a coast-town twenty leagues south of Ica, land-locked among sandy hills, and where the rays of the sun are strongly reflected and concentrated. Here the disease is called *mal de ansias* or *vomito seco*, on account of the dry retching that accompanies the attack. The *mal de ansias* commences with a feeling of sickness at stomach, and a fruitless desire or effort to vomit. But this stage of painful effort, or as it is called of *dry vomit*, is usually followed by real vomiting and evacuations, sometimes with, at other times without, spasms of the limbs.

We are informed by an intelligent native from Ica, that the irritation is greatest, and spasms most apt to occur in those, whom the disease happens to attack with a full stomach or loaded bowels; whilst all the symptoms are milder in the individuals who are taken ill with their bowels in a less embarrassed condition.

Those who are thus attacked in Palpa, and still further south at Acari, in which localities the disease is endemic, know it to be their safety to get as quickly as possible into the cooler air of the open sea side; and such is the extraordinary irritability of the gastric organs under this complaint, that the natives are impressed with a practical belief that the person who tastes aught but cold water or iced-water while it lasts, must die in consequence. But in Ica, where the air is less scorched, the disease is so far milder, that those affected with it venture to add a little cream of tartar or tamarinds to the water. The disease is said to be usually one of eight or more days' duration.

In the Memoirs of General Miller, we find it related at page 45 in volume second, that the General, (then Colonel,) suffered an attack of this disease when at Acari. The following extract bears on our subject. "At this juncture Colonel Miller was disabled by an attack of *mal de ansias*, a species of cholera morbus. He was carried in a litter across the desert seven leagues, to the Port of Lomas, where the zealous Captain Nesen was waiting with the Protector. He was hoisted on board more dead than alive. The dreadful disorder came on every other day, and continued in paroxysms of fourteen or fifteen hours, for the space of ten days. Cold water was the only remedy administered. The complaint is common in that part of the coast; but although excruciatingly violent, not one out of three or four fall victims to it. The invalid was soon so much reduced that he spoke with difficulty. His friend Dr Cordova, (now Dean of Arequipa) lay ill of the ague. Both were cooped up in the state-cabin, if so it might be called, of the brig, and neither could move from his bed."

It is to be observed that agues infest the whole coast of Arequipa from Acari, southward; and that the *mal de ansias* is not of itself a disease to appear in quotidian or tertian paroxysms. Colonel Miller's case, therefore, was one of a complicated nature, in which a *terciana*, more or less obscure, associated itself with the distressing retching characteristic of the *mal de ansias*.

The symptoms of cholera, as the disease usually appears in Lima and its environs, come on without previous warning. At times the attack comes on when at table, at other times in course of the night, or in the morning early, when the food taken on the preceding evening is brought up in a very undigested state. After a fatiguing ride in a hot day, an individual comes home in the evening, takes some refreshment, very probably eats melon, and an hour or two after he is seized with symptoms of cholera. I have known an attack of this malady follow the sucking of the juice from a piece of succulent sugar cane; and when a person happens to have taken milk, or any article of milk diet, and after this, in course of the day, commits the indiscretion of tasting some acid fruit, the cause is so generally recognized as the source of gastric disturbance, that no one is surprised to here of cholera as its consequence. It follows a fit of drunkenness; and it also frequently occurs that one has had a fit of anger, or some vexation, in course of the day, and as a sequence there is, over night, an attack of cholera with well-marked signs of indigestion. In short, when there prevails such a predisposition to the disease as is common in summer weather, any such incidental cause as now mentioned, I have known produce an attack of cholera. But indeed without any specific occasional cause, either discovered or assigned, I have known the disease come on very suddenly and violently; and it appeared to me that women were more subject to it than men.

I shall offer a few examples to illustrate the nature of cholera, as it familiarly presents itself in Lima.

1. A little girl eat rice* at dinner, drank after it iced-water, and

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* Rice is a standard article of diet in Lima. It is usually cooked with abundance of lard; and this probably is the reason why rice has the name of being very heavy, or difficult of digestion in hot weather.

was suddenly seized with symptoms of cholera. One hour after the commencement of the attack, I saw her in a state of insensibility, with a death-like coldness of the extremities, the features contracted, the eyes upcast, and the white alone visible; respiration was short and panting; and there were from time to time convulsive twitchings of the extremities. The watery evacuations had not yet commenced; but by this time she had vomited all her dinner, and remained quite exhausted, as described, to the alarm of those interested in her recovery. Under the plan of treatment pursued, which shall be mentioned by and by, the disease was very soon arrested in its course, and the child did well.

2. An elderly lady, who, two or three days before, experienced some headach, on a December morning, hot and sunny, walked some distance in town, from San Pedro to Santa Clara; and at night was seized with distressing colic pains, which were soon followed by vomiting and the consequent appearance of brain-fritters and kidneys, "*torta de sesos y unos rinones,*" which she took to dinner, and which were vomited in a sour and half-digested state. The belly was anointed with warm almond oil, with a view to relieve griping pains, with vomiting and purging of liquid matter, of colour and appearance like very dark chocolate, attended with cramps in the lower extremities. What she vomited, she reported to have been as bitter as gall, and what passed by stool felt scalding hot. She drank freely of tepid water; and tepid emollient clysters were repeatedly thrown up. Thus she passed the whole night, till towards morning, when the symptoms gave way; she fell asleep, and awoke without any further return of the complaint.

3. I have seen a nervous and delicate-complexioned young lady, who was habitually given to chew ice to brace her nerves, four hours after being seized with symptoms of cholera. I was told by her sisters in attendance, that, two hours after having finished her meagre Friday's dinner, she was taken with evacuations of the appearance of chocolate, and soon after came on vomiting, by which she rejected, in an undigested state, all that she had eaten at dinner. The evacuations and vomiting, I at my first visit observed to be still distressing; and she complained of much oppression at the præcordia, with palpitation and sense of weight and oppression, "fatiga," at the seat of the stomach. The skin was cold; the pulse small and frequent; her anxiety and general restlessness were very great, and she kept exclaiming Muero! Muero! I am dying! I am dying! Next day she felt quite recovered from this attack.

4. In time of Lent, an elderly woman, four hours after dinner, consisting of fish, onions, and white peas, with some fruit, found herself taken ill with pain at stomach, and soon became very drowsy and nearly insensible; but when evacuations commenced, she was again quite sensible. I saw her five hours after the attack commenced, with her skin cold and dry, the tongue parched, and her stools, which had the appearance of turbid water, were repeated about every ten minutes. The retching or efforts at vomiting were severe, but fruitless; the pulse quick, and hardly perceptible; the cramps

at stomach excruciating, and the patient called out Mi Muero! Mi Muero! She was very soon relieved by the use of ice and opiates.

5. A woman with the catamenia upon her eat heartily of ham and fowl, &c. one day, and early on the following morning vomited what she eat on the day before, still in an undigested state; and at the same time, she rejected by vomiting green and bitter matter, and voided stools acrid and hot, which were frequently repeated, and accompanied with violent cramps in the legs. Respiration was excessively oppressed; she had palpitation at the heart, and a painful sensation, attended with a feeling of impending death.

When this patient had a short respite of suffering, she complained that the relief was only momentary, and always followed by renewed and greater distress. Her tongue was somewhat furred; the lips preserved their natural redness, but the skin was cold, and at the wrist no pulse was felt. The flow of the catamenia was not interrupted during the attack. On the following day she was well.

6. In more intense instances than those above cited, we find the patient, whether male or female, with a cadaveric countenance, the sight obscured, the voice low and sunk, vomiting, evacuations, and cramps nearly incessant, a cold clammy sweat on the body, and the powers of life apparently about to become extinct.

The common curative plan of the vulgar in cholera, as it ordinarily appears among the natives, is short and simple. They at first freely give diluents, as warm water, or mallow water, with a little cream of tartar or tamarinds, until they consider that the patient has vomited and purged enough, or thrown off any undigested matter that may have been a source of irritation, and then they administer ice-water, which produces a powerfully sedative effect.

Opiates and ice-water conjoined are sometimes tried by several of the medical practitioners, as they always were by the writer, with unfailing success, in every case where the disease continued with urgency, after the bowels were sufficiently cleaned by the above simple means. But in cases like the first example above given, where the brain is greatly oppressed, an enema of warm water and sugar, hot fomentations succeeded by warm dry flannels to the feet, and embrocations to the belly, are useful, as, by producing a revulsion towards the lower extremities, and facilitating alvine evacuations, the head is relieved; and any warm diluent, as linseed water, rendered palatable with syrup of gum-arabic, is to be used instead of iced-drinks, until the stomach be cleared of all crude food and offending matter.

The death-like coldness of the patient does not often induce the practitioner to administer cordials and stimulants, or deter him from giving ice, of which Lima never wants a sufficient supply, regularly conveyed from the nearest ridges of the Cordilleras. The consequence of the seasonable exhibition of iced-drinks, especially in the summer months, is well known to be, that the stage of external coldness is shortened by the early removal of the painful sense of internal heat, which iced-drinks are found to relieve, while they thus render the whole attack shorter and milder. Under this very ancient[*] yet simple treatment, the fever consequent on exhaustion, or that of reaction, never appears with a dangerous aspect; and I suppose that a good reason for this may be, that no stimulants or stomachics stronger than chamomile tea, or infusion of orange rind, are commonly used in the state of collapse; for it is obvious, that, if more active remedies were used in the state of exhaustion, these might again show their accumulated effects too powerfully, when the nervous energy and sensibility of the patient become more equally diffused, and the warmth of the surface restored.

It may be remarked, that when the patient is found in a state of cadaveric-like coldness, and when all the powers of life appear to be deeply concentrated within, then it is that he anxiously calls for ice or ice-water, which, after the first passages have been cleared, as already noticed, the practitioner freely allows as an agent, which long, popular experience has amply accredited as the most powerful of sedatives, and that upon which the Limenians uniformly rely, in the cholera with which they are so well acquainted, as one of the scourges of their climate and geographic situation.

After a patient under severe cholera had freely vomited undigested food, and after his strength had failed so that he began to sink under the violence of the vomiting, evacuations, and cramps, I have known the infusion of guaco, administered by an intelligent, though non-medical friend, stop the progress of the disorder, and bring about salutary reaction in course of a few hours.

Hitherto I have spoken of cholera as seen in Lima, from my own individual experience and personal knowledge; but, as the subject is one of no ordinary interest, I will translate the sentiments of two native physicians, as published by themselves; and I know, from personal acquaintance with all the parties, that these statements from two proto-medicos are no more than a written expression of the general practice, long since approved by common observation among the vulgar, and regularly pursued, without any difference of opinion, by the different members of the profession, who at this day enjoy public confidence in the capital of Peru.

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[*] "In cholera, eorum quæ ejiciuntur suppressio mala est. Cruda enim sunt, quare nos oportet ea facile sponteque exeuntia libenter permittere; si non exeant, incitare, aquam tepidam sorbitione dantes."

"Sin autem omnia antiqua stercora dejecta fuerint, et biliosi humores transierint, biliosusque vomitus, et distentio adsint, fastidium, anxietas, virium labefactio; tunc frigidæ aquæ cyathi duo, aut tres propinandi sunt ad ventris adstrictionem; ut retrogradus humorum cursus cohibeatur, utque stomachus ardens refrigeretur." Aret. Cappad. de Curat. Morb. Acut., lib. 2, cap. 4.

" Cholera, which is vulgarly called lipyria, is a common malady in our climate, in the summer season, by reason of the abuse of fermented drinks, fruits, and food, at a time when the digestive powers of the stomach are weakened by perspiration. These powers being diminished from the moment that muscular action ceases, through sleep and the repose of bed, it is at night that the disease makes its invasion.

" It begins with giddiness, followed by vomiting, and copious evacuations, of various appearance, cold sweat, cramps, and death, if not checked in its progress. Those who would like to guard against this dismal illness should avoid the excesses alluded to, and retire to rest with a light stomach; but should they find themselves burdened with aliment which they are unable to digest, or incommoded with symptoms of acidity, they should use means to reject the undigested aliment, exciting vomiting by aid of warm water, and irritating the fauces with the fingers, or with a feather; or, in place of exciting vomiting, they may cause a pair of purgative clysters to be administered, and presently take a couple of cupfuls of warm water, with sugar and some stomachic, as chamomile flowers, theriaca, orange peel, &c.

" Should this practice have been omitted, and should cholera supervene remissly, or not in a sudden or violent degree, the indication is to dissolve and expel the humours of the stomach, taking abundantly, in form of drink, and by clysters, chicken-water or other equivalent; and after the stomach is considered to be unloaded, then will be used the stomachic drink which we have pointed out.

" But if cholera has supervened with violence, and the patient has voided a great quantity of humours, upwards and downwards, the ready remedy by which to relieve him from his struggle is to make him drink iced-water, (no matter whether it be natural water or chicken-water,) alone, or in form of lemonade; and he may also swallow bruised or pounded ice." Unanue sobre el clima de Lima, p. 278–9.

Dr Valdes, at page 13—14 of his pamphlet, entitled Memoria sobre las Enfermedades Epedemicas, que se padecieron en Lima El ano de 1821, Estando Sitiada por el Eejereito Libertador, writes as follows:

" And although the disease, cholera, is almost endemic among us, in the said year many more sick were affected by it than in preceding years.

" It attacked some who had eaten too much, or drank spirituous liquors; and others without manifest cause. The dejections were at first bilious, and afterwards whitish or serous. These were promptly followed by intense thirst, burning heat in the interior of the abdomen, coldness in the extremities, pulse small and frequent, hiccup, cramps, and other ominous signs; but all yielded to ice, taken without delay."

"It is amazing to see the quickness with which the vomiting becomes suspended, the evacuations diminished, hiccup removed, and the pulse raised and regulated; and without any assistance except this, (viz. ice,) and that of our subacid paps or 'mazamorras,' as only nutriment, those recover their vitality and strength, who but a few hours before presented a living and horrid image of death.

Lipyria.—The disorder designated by the Limenians under this name is not *cholera*, though Unanue, as we have seen, makes use of the term *lipyria*, as synonymous with *cholera;* and in some parts of the interior it is still used in this general sense, as we may have an opportunity to notice hereafter. At present, however, I will give an instance of what I have been taught to consider as the true lipyria in Lima.

A Zamba girl eat rice and melon with great relish, but the result very soon after was an attack of perfect lipyria, characterized by cold sweat, eyes red, and so full, that they appeared ready to start from their sockets, headach violent, and pain of belly insufferable.

As this form of disease is sudden in attack, and follows soon after the exciting cause has been applied, the usual treatment is to give warm water, and procure vomiting, by which the offending matter is rejected, and the paroxysm ended; but should the disorder go on to assume the character of a regular cholera, then the treatment is the same as in that disease.

Diarrhœa.—Among the diseases which daily require the anxious attention of the Lima practitioner, are diarrhœa and dysentery. And these diseases are at no season more likely to occur in an untoward form, than during the winter months, after the mists and cloudy weather have fairly set in.

When the fine weather of summer is prolonged throughout a considerable portion of autumn, the inhabitants of the coast still continue the light dresses, as well as evening walks and promenades to which they are used in summer; yet, from sunset to sunrise, they no longer breathe the warm breezes of the preceding months, but a cool, damp, and penetrating air.

During the hot sultry months the Limenians very generally, indulge in the custom of resorting, especially early in the morning and at night, to the Palace or Cathedral Square, to refresh themselves with cooling beverages, of which a great variety is sold there. But when this custom, which is as safe and agreeable as it is cheering and sociable in the summer time, is continued after the season has changed, and when the night and morning air has become cool and damp, its effects are often injurious. Diarrhœa is one of the commonest disorders which occurs under these circumstances. And as conducing to this disease, when it prevails among the fair sex, I must not omit to advert to their passion for having their feet look exceedingly neat, by wearing the finest shoes and stockings. For these are very unsuitable for walking the streets of Lima with in time of *Garua*, or hazy and drizzly weather.

During winter, especially in the months of July and August, many persons are affected with vomiting of pure bile; and others with frequent liquid stools of hot and acrid quality; or with bilious diarrhœa, combined with more or less nausea and vomiting.

At this season, too, micturition is sometimes toublesome and frequent, more particularly with those travellers who have just arrived from the warm and dry inland valleys. They are so affected from the sudden transition of climate, and just in proportion as the transpiration from the surface of the body is checked. These ailments of internal congestion with augmented secretion, which may be traced to the external agency of cold and humidity as a general cause, are daily removed, because the balance of the circulation is restored, in a great majority of instances, by such means as open the skin and keep up diaphoresis. But I may remark, that giving iced-drinks, with a view of restraining the excessive secretion of bile, in the cases of bilious derangement and disturbance of the alimentary canal, which so often occur in the wet season, is not safe as a general practice, especially in persons of weakly constitutions, in whom a healthy reaction may not be readily induced. Cooling beverages and ice, indeed, are highly approved and recommended by daily experience, in the bilious disorders of the warm and dry season; but it should be remembered that then the nervous and vascular systems are too much stimulated by atmospherical heat, and the dermal capillaries are so particularly active that iced-drinks are not merely borne with safety, but freely used with great relish and comfort.

The exciting causes of diarrhœa are so numerous that, even without any special regard to the season of the year or state of the atmosphere, the disorder may be daily traced to a great variety of other sources. Frequent liquid alvine discharges are often occasioned by the irritation or inflammation induced in the surface of the mucous membrane of the intestines, by fruit of various sorts, and in different stages of maturity; different articles of food, which are often voided in a half-digested state; and I may also mention the presence of worms in the bowels. Some chronic and very obstinate forms of diarrhœa are sustained by an ulcerated and thickened condition of the mucous membrane of the colon and rectum. I have seen severe cases of this character, in which relaxation of the *sphincter ani*, accompanied with a protrusion of the rectum, took place, as often as there was occasion to go to stool.

As diarrhœa is one of the most common diseases on the coast, and, at the same time, one of no small danger when neglected or mismanaged, it may be convenient to detail the appearances under which, in cases of this nature, the alvine discharges usually present themselves. In this manner some idea may be formed of the nature and seat of the morbid causes which induce the various modifications which I shall endeavour to point out.

I specify, 1. *Diarrhœa distinguished by an increased mucous discharge.*—This is a common modification of the disorder, which indicates a catarrhal affection of the intestinal mucous membrane. It is rarely attended with any serious disturbance of the circulation or general system. The tongue is whitish and often clammy; the pulse not much affected. The attack comes on with some chilliness or feeling of cold, often referred to exposure to night air. Those who are thus indisposed rarely require the help of the physician. For such slight disorders of the bowels are commonly removed by general warmth, rest, pediluvia, farinaceous diet, and diluents.

2. *Diarrhœa marked by a dry skin and thin serous stools.*—In this form of diarrhœa, the tongue is furred; the pulse considerably quicker than usual; appetite impaired; skin dry; the stools frequent, dark, fetid, and serous. I have observed cases of this kind occur in the misty or wet season, when it was found difficult or impossible to restore the skin to its naturally soft and perspirable state.

Absorbent medicines, aperients, and warm-baths, mitigate the symptoms of this disease; while, on the other hand, opiates and astringents are apt to cause tension of the abdomen, and aggravate the complaint. And these remedies are found to prove injurious in proportion as they restrain the intestinal secretion, which may be considered as vicarious of that of the skin. When medicines fail to correct this affection in Lima during winter, a visit of a few weeks to Chorrillos should be recommended; for in this favoured locality the climate during the wet season is so benign that it naturally tends to restore the proper balance of the circulation, and will often render the cutaneous vessels and excretories easily acted upon, by the application of those very remedies which in Lima might be long and sedulously used without success.

3. *Diarrhœa characterized by deficient biliary secretion.*—In strongly marked instances of this kind of diarrhœa, the most striking symptoms are, white evacuations, which are frequent and troublesome in course of the night; a dry skin; loss of appetite; depression of spirits; and, in protracted cases, general wasting of the flesh. Disorders of this character are more frequently met with in the chronic form. In every instance which came under my notice, the remedies used, with perfect success, were common aperients, and the immersion of the hands or feet for twenty minutes or half-an-hour, morning and evening, in the nitro-muriatic acid bath.

4. *Diarrhœa characterised by an augmented biliary secretion.*—This is the modification of diarrhœa with which, above all others, the people of Lima are familiar. We have already seen that it is prevalent during the winter months; and in spring, when the sun shines forcibly in the middle of the day, one may complain of feeling chilly, and then some uneasiness is felt in the bowels; the tongue is foul; anorexia, perhaps nausea or bilious vomiting take place; and slight headach, with some alteration in the pulse follow. A call to stool comes in the train of the above symptoms, and relief is obtained from much griping by voiding several stools of a dark, fetid, and feculent appearance, mixed with a thin yellow, frothy, and bilious discharge.

In the warm and dry season, we find the patient who complains of disordered bowels, which he attributes very often to immersion in the cold bath, with a white tongue, especially in the morning, affected with either drowsiness or giddiness, general languor, and a distaste for food; and in the course of the day, some griping is felt, and soon followed by two or three loose stools. These evacuations are sometimes of a rhubarb colour; more generally of the colour of yolk of egg; often frothy, and voided with a sensation of scalding heat.

Cases like either of the above are usually treated very successfully by farinaceous diet, starch enemata, and as common drink, linseed and mallow water, sweetened with syrup of gum-arabic, or, two or three times in course of the day, a glassful is taken of an infusion made of tamarinds, linseed, roses, and mallows, in common water sweetened with syrup of roses. Perhaps the state of the bowels may require a purgative, in which case manna with rhubarb, made into a beverage with sugar and water, usually called *angelica*, is found to answer very well in most instances; for in these cases the remedial means are generally simple.

Disorders of the liver being very prevalent, hepatic patients are sometimes seen in Lima, who hardly ever perspire in summer or winter. They suffer habitually from a painful sensation of heat in the region of the liver, extending to the shoulder, or interscapular region. The tongue is furred, of a dirty white appearance. They endure but very little covering by day or by night; and they say, that even their ordinary clothing is troublesome to them, by increasing the heat, or "ardor," which they always experience in the affected side, as well as between the shoulders. And though it is evident that in such examples, the liver is seriously in fault, yet we may not be able to detect any palpable alteration in the structure of this organ, or any induration, unusual sensibility, or tumefaction, in any part of the abdomen.

Chronic ailments of this nature are alleviated by warm baths in the wet, and cold baths in the dry season. But persons who are affected in this way are obliged to observe a careful regimen, and are peculiarly subject to attacks of diarrhœa. At one time the motions are sanguineous, with or without a considerable portion of mucous matter; at other times, the evacuations are not sanguineous, but as yellow as broom blossoms, or as green as the clover leaf.

I have witnessed some cases in which the motions were copious, and quite of a bilious appearance, accompanied with dull pain at liver, a white and furred tongue, but without much of a febrile pulse.

Cases of this character, which are obviously sustained by great disorder in the functions or structure of the liver, are sometimes benefited by local bleeding and blistering, with bland diet, and laxative aperient remedies; or they may require the application of mercurials, aided by the warm bath; and, on many occasions, entire change of climate is required. In most instances, however, where we meet with a diarrhœa of long standing and hepatic origin, bleeding may be very well dispensed with, as the practitioner, on a review of all the circumstances, will be able to judge, and mercurial inunction may be safely and advantageously resorted to at once. And I may observe, that from the external application of mercury in the manner alluded to, aided by minute doses of calomel, I have witnessed the best results, in some cases of a chronic muco-sanguineous diarrhœa, when connected with the presence of a great many movable tumours about the size of walnuts, situated within the abdomen. Both the tumours and diarrhœa disappeared as the salivary organs were slightly affected by the action of the mercury.

The worst forms of diarrhœa met with in Lima cannot be enumerated under any one of the general heads above specified; for they are usually of a very mixed character. It often happens, that for some days, the stools are entirely of a bilious aspect, and attended with very little alteration or acceleration in the pulse; but, as these cases grow inveterate, they may pass into dysentery. And in other cases terminating in dysentery, the evacuations, for several days, or even weeks, consist of acrid matter of various appearance, or vitiated secretions of many colours, and more or less feculent quality; or, perhaps, yellow when voided, but soon becoming dark-looking on exposure to the air.

In those examples of diarrhœa, when the evacuations are of a mixed character, of a bilious and yet somewhat slimy and ropy appearance; of a greenish colour, and as many as seven or eight daily; the natives take alarm lest the disorder should end in real dysentery. The women more particularly are most observant of these signs of approaching danger; for from their childhood they are taught to watch, when in any degree indisposed, the appearance of the egesta, from which they are accustomed to infer what it may be safe for them to eat. One of these women, who is accustomed, when in health, to eat of everything that she fancies, or comes in her way, is no sooner affected as I have just described, than, first she starves herself, and then sends for the physician. She tells him, probably, that her illness has been coming on gradually for some days before; that since its commencement, she has carefully denied herself every kind of food, except a little "alaguita de mais blanco," or gruel of white maize meal, alternated with the standard drink on such occasions, an infusion of roses and linseed, slightly sweetened with the azucar rosada, or rose sugar. So much apprehension and caution on the part of the experienced natives show better than the most elaborate discourse could do, the acknowledged common tendency of such ailments.

Mental affections, and disturbed states of mind, have often a remarkable share in producing various degrees of deranged digestion.

In some instances we find that depressing passions of the mind disorder the functions of the liver, debilitate the stomach, give rise to indigestion, and hence induce diarrhoea; and that at other times, the exciting passions, as anger, cause very great disturbance in the bowels. Thus it is curious to observe how frequently bakers are subject to disorders of the bowels in Lima.

This is a class of men whose temper is incessantly tried, and often fretted in course of their daily avocations. The bake-houses are used as kind of penitentiaries, or places of temporary penance and chastisement, wherein delinquent slaves are employed at hard labour. With these the bakers have to contend in the character of task-masters; and hence the conflict of opposing interests and passions which renders the slave sullen, and keeps the overseer in a state of constant disquiet. Nor is it the baker alone who exhibits the effects of the mind over the body; for persons of every class and occupation on the coast, whose dispositions happen to be quick and choleric, are peculiarly prone to diarrhœa. It is therefore a very general custom with such people to endeavour to counteract the known tendency of their irascible emotions, in altering the condition of the intestinal secretions, increasing the biliary secretion, and disturbing the bowels, by taking as preventives ices, and iced pine-juice in particular; by means of which, in hot weather at least, they are really refreshed, and relieved for a time. In ordinary examples, where diarrhœa is habitually induced from certain disagreeable states of mind, other exciting causes may also have a share in producing the same effects, as errors in diet, or too much bodily exercise and frequent exposure to the sun. In bakers in particular, whose duties at certain hours consign them to the annoyances within doors; and, at others, oblige them to ride about a great deal in the sun, I have observed that they were often relieved of very severe attacks by their own popular remedies; viz. tepid, mallow, and aperient drinks, or whey with manna and tamarinds, and other emollient and soothing means in current use as warm baths, cataplasms, unguents, and enemata.

But when the diarrhœa continues in spite of these or other means, timeously tried, and is known to be kept up by the operation of moral causes preying on the mind, then we may expect to observe pyrexia come on, with more or less tenesmus; and, perhaps, the belly may at some point feel tender to the touch. Now the evacuations, whatever may have been their original character or appearance, begin to show some traces of blood, become less free and copious, but oftener repeated, and are, in this state, what the natives denominate "Picando in Bicho," that is, merging into an established dysentery.

ART. V.—*Observations on the protecting power of Vaccination against Small-Pox.* By JOHN STUART, Esq., Surgeon, Kelso.

THE great increase of small-pox of late years, not only in this country, but all over Europe, is exciting an intense interest in the minds of medical men, and raising doubts as to the protective power of vaccination, which are exceedingly discouraging. From the great number of cases now reported of individuals having had small-pox after vaccination, it is impossible to deny the fact, that vaccination does not afford the complete protection, which, but till very lately, we fondly thought it did. Failures have multiplied so rapidly that we can no longer attribute them to imperfect vaccination, or to impurity or degeneracy of matter. The subject is one of the greatest importance, not only to the profession, but to the community at large, and well worthy of all consideration; and it can only be decided by fair and open discussion, judging from facts alone, and discarding from our minds the authority of great names, and all preconceived opinions.

Since 1816, small-pox has prevailed several times in Kelso and neighbourhood, giving me an opportunity of seeing much of the disease. In the autumn and winter 1834–35, it attacked a great number of individuals, vaccinated and unvaccinated, and from the experience thus obtained, I ventured to draw the following conclusions. That vaccination affords but an imperfect protection from small-pox at all periods of life; that the protection becomes more imperfect as the individual advances in life; and that, at the age of puberty, the influence of vaccination, (providing it has been had recourse to in infancy,) nearly ceases, but, at any rate, in the majority of cases at the age of twenty, vaccination ceases to exercise any protective power whatever.

It was not from a few cases that I was led to the above conclusions, but from a very great number. I regret that I did not keep a record of them. This is now of less importance, however, as the published reports of the London Small-Pox Hospital, and of various institutions on the Continent, afford ample data to confirm the views I have adopted; and from these reports similar conclusions have been drawn and ably maintained by the editor of the Lancet. It is now upwards of twelve years since I began to doubt the permanent efficacy of vaccination. At first I got few of my colleagues here to agree with me; but I believe all of them are much inclined to do so now, after what they have seen in the last epidemic. In February 1835, I wrote to my friend, Dr John Scott of Edinburgh, on the subject, requesting his opinion, as well as the opinion of any of his medical acquaintances. In answer he wrote, that my views agreed with Dr G. Gregory of London, and with what he himself had seen, but were directly opposed to those of the most experienced of the profession in Edinburgh.

In consequence of the adoption of these views it became with me a matter of consideration, whether or not vaccination ought to be repeated at certain periods of life. I thought it ought, and especially at the age of puberty. I have, therefore, regularly recommended it for the last twelve years, and have generally found, as might have been expected, that secondary vaccination was successful, just in proportion to the time which had elapsed from the first operation,—cow-pox, in fact, modifying itself as it modifies small-pox.

I have had several satisfactory opportunities of verifying this in families, in which I knew the greatest care had been taken with the previous operation, and the result was such that I could, from the appearances of the pock, have nearly guessed the respective ages of the individuals thus revaccinated. In a family in this neighbourhood in January 1835, I revaccinated four persons at the ages of 14, 16, 19, and 20. In the first the modification was considerable; in the second less; in the third still less; and in the fourth there was as perfect a cow-pock as I ever saw, and it went through all the various stages quite regularly. There was a difference, too, in the progress of the pocks. The first came to a height on the fourth day; the second on the fifth; the third on the seventh day; and the fourth on the eighth day.

In adults I have often by revaccination succeeded in producing perfect pocks, from which I have taken lymph, and with it have vaccinated infants with perfect success.

In the consideration of this subject three questions naturally arise—Has the cow-pox virus degenerated? Will revaccination protect the system for another period? and How long?

I am decidedly of opinion that the vaccine virus has not degenerated; because it is observed, that those individuals who were vaccinated upwards of twenty years ago, are less protected than those who were vaccinated only a few years; the very reverse of what would be the case had the virus degenerated. Although it is upwards of twelve years since I have been in the habit of employing revaccination, yet the time is too short to allow me to answer with confidence the other two questions; but as yet I have not seen any individual take small-pox after a second revaccination; and this is certainly some encouragement to continue the practice.

Knowing the great interest which Dr G. Gregory of London takes in this question, and the extensive field of observation which he enjoys, I was induced to write him upon the subject. He very kindly gave me a full exposition of his views, with leave to make such use of his communication as I might deem fit. It appears to me to contain so much novel and valuable information, that I am sure no apology to your readers is necessary for giving you his communication in full.

31, *Weymouth Street, London, March* 2, 1839.

Dear Sir,—I am much obliged to you for the trouble you have taken in communicating to me so fully and circumstantially your views on the question of vaccine influence, and the progress of your mind in respect of them. I am very much struck with the coincidence in our opinions, and cannot but view this as a proof of the correctness of our respective ideas. In fact, your notions (as stated in your letter to Dr Scott of Edinburgh,) correspond perfectly with my own. The facts are all corroborated by facts under my own observation, and the inferences appear to be incontrovertible.

Before I proceed to offer you some further suggestions grounded on the facts and opinions brought forward in your letter, and in my Report for 1838, let me finish what requires to be said in answer to your letter. You put three questions to me in the latter part of your letter. *1st*, Has the virus degenerated? Your answer appears to me strictly correct. Degeneration can have nothing to do with the (presumed) diminution of vaccine security. It is very true that lymph may, from various causes, become less intense at one time than another, and recourse to the cow for fresh supplies may at times be useful, but persons vaccinated with fresh lymph are still liable to suffer in after life from small-pox. The only question may be as to time and intensity. The distance may be longer, the intensity of the attack may be greater, in the one case than it is in the other, but the receptivity will be the same.

2. Will revaccination protect, and for how long? The true answer I believe to be as follows: The value of revaccination is in one sense proportioned to the effect produced. If revaccination produces a full eight-day pock with areola, it stands *loco primæ vaccinæ*, and the individual may be said to open a new policy of vaccine insurance, dated from that period. On the other hand, if the revaccination produces little or no effect, (a mere irritated papula,) nothing is taken by the motion. The individual remains in *statu quo ante* revaccination. But then comes the question; will a modified effect serve to fill up the measure of vaccine protection decayed during the preceding ten, fifteen, or twenty years? This is the pinching part of the question. My persuasion is, that you cannot thus multiply degrees of vaccine protection. Two imperfect vaccinations do not, in medical arithmetic, equal one perfect one; no,—nor three, nor four, nor twenty. Modified or imperfect revaccinations therefore, in my estimation, = 0; they are worth nothing. They irritate the arm, and that is all. The constitution is uninfluenced by them. I may be wrong in this, and I am ready to correct the error, if it can be shown to be error; but all my experience goes to this. The doctrine of proto and deuto-vaccinations will soon merge in that of trito, and ultimately (as time creeps on,) in polyvaccination. Will a man be perfectly safe (that is to say) who is vaccinated (or subjected to vaccination) every year? Those who support the present fashionable theory and practice of revaccination will please answer this question.

3. Is it desirable to expose children after vaccination to the infection of small-pox, rather than keep them away from it? If the vaccinated (children or adults) are to be kept at all times, or even during small-pox epidemics, in a sort of moral quarantine,—if the feeling of the public mind, *quoad* vaccine security, is sunk so low that they cannot be trusted in company with small-pox, *cadit quæstio*, it is needless to argue the question. Security is changed for insecurity—confidence gives way to distrust. The sooner, then, we go back to inoculation the better. This matter now becomes really of most pressing interest. I grieve to say that almost universally in London, among the higher orders of society, and equally generally among the medical men, there exists a practical want of confidence in vaccination. The moment small-pox appears in any house or in any family, the individual is separated from all intercourse with others, and a grand family revaccination is forthwith instituted. Now really this is encouraging the pub-

lic in their distrust. No wonder people grow doubtful when their medical advisers are thus suspicious. I am quite aware that in saying this, I am opposing myself to you,—for you say, " I always advise revaccination." I do so now occasionally, but I do it always with regret, and from a feeling that the public mind runs that way, and it is idle in an individual to pull against the strong current of public opinion. My answer to your third question, therefore, would be, never withdraw the vaccinated from small-pox infection. If you have done what is right in the way of protection, there is no need for seclusion. If you have not protected sufficiently, make that protection as good as you can, not by multiplying imperfect protections, but by the substitution of a better.

I have now brought you to the point which I have been anxious to gain. I have never yet addressed any one, in writing, on this subject, and I now write to you on it, because I see that you have considered it well ; that you have thrown off the trammels of Jennerian pathology, and are content to think for yourself. Observe, I say, Jennerian pathology, not Jennerian practice. I feel assured you do not view vaccination as a kind of small-pox. The term *variolæ vaccinæ* was incorrect in pathology. Cow-pock is a something that alters the human blood, and indisposes it to take small-pox. But it is not small-pox. A coating of gold secures our salt spoons from the action of chlorine ; but gold is not chlorine. Small-pox after vaccination is not on a par with double small-pox. Small-pox after vaccination is a first attack of small-pox, and may be followed by a second some twenty or thirty years hence. Well, then, what is to be done to fortify the public mind in the matter of vaccine security ? How long are we to go on thus showing annually or epidemically our practical distrust of vaccination ? The sooner we come to a decision on the subject the better. There is one, and only one way in which this can be done. Not by revaccination, but by inoculation at distant periods from the date of vaccination. It is of no use to inoculate for the first eight years of a child's life. That has been done often enough. Inoculation produces no effect then. But what are the effects of variolous inoculation at long intervals, and in different habits, and under opposite circumstances. Let 1000 vaccinated persons then submit to inoculation under varying circumstances ; of all ages from 8 to 38 ; whites and blacks ; men and women ; persons vaccinated in the town, and others in the country ; English men and women ; natives of hot and of cold countries, &c. Let this be done on a grand scale, (1000 people), and we shall then understand the subject. " To this complexion we must come at last ;" and the only question is, who will first suggest it ? Once suggested it will be acted on, because it will be seen that in no other way can we come to the right merits of the question. The experiment would soon be completed. If a beginning were once made, there are plenty of people who would come forward, but no one likes to begin. If it was necessary, in the onset of vaccination, to satisfy men's minds by the test of inoculation, if that test was, in point of fact, the sole basis of our original notions on the subject of vaccine security,—surely it is right now to have recourse to the same test, when the public mind is full of doubt and suspicion. What would be the results of such a grand but decisive experiment, I do not pretend to anticipate. It would be useless to do so, and unphilosophical. Placed as I am, at the head of the Small-pox Hospital, I am unwilling to come prominently before the London world with such a proposal. But you have my full leave to make whatever use of this letter you please in Scotland. I have no objection to its being sent to the Edinburgh Medical Journal;—but the whole question should be gone into as here stated. Pray let me hear from you again soon. —Ever yours very truly,

G. Gregory.

Mr Stuart to Dr Gregory.

Dear Sir,—I feel much gratified by your replying so immediately and so fully to my communication on the vaccine question.

By your answer to my three queries, I see that we agree as to the first, but not entirely as to the second and third. The second is the puzzling one; and I am by no means satisfied myself, although I recommend it, that revaccination gives renewed security; but recommend having recourse to it, because I believe it can do no harm, in hopes that it may do good; and also because it serves as a sort of guage of the amount of security actually possessed by the individual at the time of revaccination. If I found that revaccination produced little effect, or a very imperfect pock, I would consider the individual as still being pretty secure, and likely to continue so for some time, and not requiring the operation again for some years perhaps. I do not think, therefore, that I would be driven to the necessity of revaccinating every year as you suppose. You appear to be quite satisfied, however, that a modified cow-pock gives no additional security, and is of no value. Is it of no value, if it indicate, as I suppose it does, the amount of security a person may have on hand? Does an attack of modified small-pox give security against an attack of small-pox in after life? If it does, why should modified cow-pock not have effect also? Besides, although I approve of revaccination, I never think of it previous to the age of puberty; for if the individual take small-pox any time before this period, I know he will have a slight disease, and unattended with danger; and therefore I see no use in revaccinating sooner, but rather the contrary. Family quarantine I consider quite out of the question previous to puberty. You are quite right in believing that I consider cow-pox and small-pox two distinct affections.

Now, with regard to the grand experiment which you propose, with the view of testing the value of vaccination in persons of every age and nation, and of every hue, I admit it would be decisive; but I do not see very well how it could be carried into execution. Do you mean that it should be done by various individuals, each furnishing his quota of cases, or by a public body, who would carry on the experiment on one grand scale? Unless Government, to settle people's minds on the subject, take up the measure and defray the expenses, I do not see very well how it can be carried into effect.

You kindly give me leave to make what use of your letter I please. I had no intention of laying my views before the public, apprehensive that, coming from a provincial practitioner, they would make little impression; but, perhaps, supported by your authority, they might awake the profession from their slumbers, and cause the question to be duly discussed. If I do make up my mind to send a paper on the subject to the Edinburgh Journal, would you object to my introducing your name, and stating fully your views as given in your letter to me. Before sending any communication, however, I would transmit it to you for your revisal, that there might be no mistake.

DR GREGORY to MR STUART.

13, *Weymouth Street, London, March*, 13, 1839.

MY DEAR SIR,—Many thanks for your letter No. 2. I am quite pleased to think you really contemplate a paper for the Edinburgh Medical and Surgical Journal. From what you have written to me, I feel assured that you are on the right scent, and I would encourage you by all means to carry out your intentions. Pray make whatever use you can of my last, and of this communication, and of any further hints which I may be able to give you. I shall be most happy to revise your paper, should you wish me to do so.

The present letter shall be devoted to the consideration of two points:—1. The practicability of a grand Adult Inoculation post Vaccination; 2. The real Pathology of Vaccination.

1. I need not tell you that the Vaccine Board have always discouraged inoculation, and have made no distinction between primary inoculation and experimental or secondary inoculation after vaccination. I have always been of opinion that this was very injudicious, and "am of the same opinion still." Were the *taboo* taken off, were it a general feeling that such secondary inoculation was neither wicked nor unprofessional, the practice would soon spread. In this wide world, some one would be willing to begin; others would follow. The results would be communicated in the periodical journals. By degrees we should have

1000 cases recorded, and the profession would have their minds quieted and their opinions settled on indisputable grounds. It is hopeless to expect the Vaccine Board to take up this or any other matter, save that of transmitting packets of lymph and counting them. Else, if they would, nothing would be easier than to admit into the Small-Pox Hospital for secondary inoculation such persons as chose to apply. We would willingly receive, feed, and attend to them for the ten or fourteen days that the experiment would last. But as it is, with the annual denunciation against inoculation of all kinds, no one can do it, except here and there. I have had but one case. In that case, the success of inoculation post vaccination (ten years' interval) was perfect. A good deep local affection, and six constitutional papulæ drying off on the third day. All I ask is the removal of the *taboo;* the rest will follow.

2. Now as to the real Pathology of Vaccination. Jenner's theory must be given up, viz. that cow-pox is only small-pox in its mildest and most original form; that a man has cow-pox now instead of the small-pox which he had formerly; that small-pox occurring after cow-pox is analogous to small-pox after small-pox. These three positions, the foundations of Jenner's notions, are, I believe, entirely groundless and imaginary. The true pathology of vaccination is altogether different. Let us inquire into it.

All men, or nearly so, are susceptible of small-pox by inoculation at any period of their lives, provided they have neither had it before, nor are in some way indisposed (as by preoccupation of the system by fever or measles, or by prior vaccination).

But many men are exposed to the epidemic or infectious mode of reception, and escape it, year after year. I know a lady, who, after bringing up a large family, was herself successfully inoculated at 83 years of age, and lived several years afterwards. Why did she not take small-pox by the casual mode? She was exposed to it scores of times.

Well, then, it is quite clear that people will take the disorder in one mode who resist it in another. Resistance to the casual mode of infection (the epidemic influence or contagion,) does not necessarily involve resistance to the mode by cutaneous absorption, just in the same way as a man may break through a window, when the door is closed. The analogy I hold to be quite perfect.

Now, vaccination has the extraordinary power of giving to the human body the singular property of resistance to the variolous effluvium. Vaccination is not small-pox, but just the reverse,—the antagonist principle.

What wonder, therefore, can it be, if time should demonstrate, that the power of resistance thus conferred, is confined within certain limits; as thus;—

1. The power of resistance is complete (both as to casual and inoculative admission) for the first ten years of life.

2. The power of resistance ceases in certain constitutions before it ceases in others.

3. The power of resistance given by cow-pox ceases *quoad* inoculation before it ceases *quoad* the casual (or infective) mode of access.

4. The power of resistance is diminished, by any great changes taking place in the human frame, whether brought about by puberty, or change of climate, or by a long fever; or lastly, by gradual and insensible changes taking place in the system.

There may be many more laws affecting the general principle of resistance given by vaccination hitherto unsuspected. I believe there are. I see daily facts inexplicable on any known principle. For I wholly throw out of consideration Jenner's fanciful notions of vaccination impeded by preoccupation of the skin; of vaccination rendered imperfect by the virus being taken at too late a period; or the more modern notions, that too few vesicles are raised; or those few not developing a sufficient amount of constitutional fever. All this is mere unauthorized theory. Two or three good vesicles on the arm constitute vaccination. When small-pox subsequently occurs, do not then reason *ex post facto*, and say the vaccination was faulty, but find out what are the laws which limit the principle of vaccine resistance.

I am really ashamed to occupy so much of your time with the A. B. C. of vaccination; but Jenner set us all so wrong by his term *variolæ vaccinæ*, that it is really difficult to get out of the false (because so well beaten) track. If he had wanted a short expressive term, it should have been *vaccinia antivariolosa.* We should then have set ourselves to study how far the antivariolous power extended, and by what laws it is limited.

You may naturally say to me, why do you, holding these notions, and believing them to be the very pith and marrow of the questions at issue, not state these opinions publicly? My answer is this:—

I am Physician to the Small-Pox Hospital, which has somehow or other been supposed to be inimical to vaccination. Nothing can be more unreasonable; nothing more untrue. But the feeling exists, and if I write *ex professo* attempting to retrace our steps, and to exchange the notions generally entertained regarding the very basis of vaccine pathology, I shall be accused of wanting to bring small-pox inoculation into fashion again. I desire no such thing; but I want to know what we are really about, and not to go on blindly. Give a dog a bad name, they say, and you may as well hang him. They have given inoculation a bad name, and no one now can have recourse to it, even for useful purposes.—Believe me to be, Dear Sir, ever yours very truly, G. GREGORY.

If the views entertained by Dr Gregory and by me be correct, we have no reason to expect that small-pox will ever disappear from amongst us, in consequence of the introduction of vaccination; on the contrary, I believe that it will now go on increasing both in frequency and intensity, as has been most undeniably the case during the last few years. I am notwithstanding a staunch friend to vaccination, which I deem one of the greatest blessings ever conferred on mankind, although it has not realized all our expectations. I am very glad that the Legislature has now taken vaccination under its protection; at the same time I doubt the wisdom of that clause of the Vaccination Bill passed in the last Session, which renders so highly penal the having recourse to small-pox inoculation under any circumstances. In Scotland, vaccination is as generally diffused amongst all classes of the community as we can ever expect it to be, and small-pox inoculation is quite unknown, and yet small-pox increases amongst us. This increase is not owing to vaccination being neglected, but owing to its affording but a temporary protection, as we have but too much reason to fear. What is now to be done, then, to remove the doubts on the efficacy of vaccination which so generally prevail? I confess I see no measure calculated to accomplish this object so effectually as the one proposed by Dr Gregory in his first letter; and how can this now be done in the face of the Vaccination Bill?

ART. VI.—*Observations on Corpora Lutea.* Part II. *Containing a Description of the appearance of this Body in the more common of our Domestic Animals.* By ROBERT PATERSON, M. D., &c., Physician to the Leith Dispensary.

IN a former communication on this subject I shortly described the appearances of the true *corpus luteum* in the human female. I considered it, as regards its early and mature stages, its anatomical position, and the manner in which it disappears from the ovary. To these were added some observations on the false or spurious bodies which have so frequently been confounded with the true *corpus luteum.*

It was my intention now, to have examined the question of the possibility of a true *corpus luteum* ever occurring without impregnation. But it will be obvious to every one, that it is necessary to resort to experiments on the lower animals for assistance in the solution of this question, as no single individual, however extended his experience or opportunities, can be expected to accumulate sufficient evidence from the human female alone.

In the course of our experiments and observations on this subject, extended as they have been over the space of several years, many curious and interesting facts have come under our notice; and, as it appears that the distinguishing marks of the true *corpus luteum* in the lower animals are not very generally understood, and the confounding the true with the false *corpus luteum*, as was so long and often done with that of the human female, is not unlikely to have taken place; and further, as it may assist others in pursuing a similar inquiry; it has been deemed advisable to devote a part of the present series of observations to the examination of the *corpus luteum* in the more common of our domestic quadrupeds.

Before entering, however, upon the description of the *corpus luteum* in the different domestic animals separately, I shall premise a short description of the process for the evolution of the ovule and the formation of the *corpus luteum* in the different classes of animals.

When the ovaries are hollow, as is observed in fishes, the ova are gradually pressed from the ovary into the oviduct, their passage along which is assisted by the contractility of this passage; no changes taking place in the ovary further than the loss of a certain number of ova, and the retraction of that part of the sac.

In the urodiles, the mature egg distends the membrane into a pediculated calyx, which then makes its issue from the cavity. The calyx or covering of the ovum then bursts, and is speedily absorbed along with its pedicle. In the chelonian reptiles, the membrane of the ovary which has become torn in allowing the exit of the ovum, remains for some little time in the form of an empty pouch, which by degrees contracts and disappears. In birds, the ovarium consists of a number of separate bags, which are attached by peduncles to a common stalk. These are called the yelk bags.

In consequence of the ova of birds being placed in different sacs, a very different process takes place for their evolution. The egg, as it enlarges, gradually distends the compartment or sac of the ovary in which it is placed, and, by bursting the enclosing membrane, escapes into the oviduct. Upon the escape of the ovum into the oviduct, the previously distended and torn membrane remains under the form of an empty sac, which is completely obliterated in the space of ten days, without the formation of any body whatever within it. This is probably owing to no blood being effused after the rupture of the distended sac; for in birds there is a white spot formed at the point at which the rupture takes place. This white point is destitute of vessels, and, therefore, no blood is effused. In the Mammalia, and more especially in the lower orders of the class, a white spot is to be seen before the rupture of the vesicle; but this spot is always much smaller than in birds. Blumenbach compares this process to the opening of an abscess, which results in part from the pressure of the accumulated fluid, and in part by the absorption of the walls of the abcess, especially at the point where the rupture is about to take place.

In the Mammalia, however, a very different process is followed. The ovary is composed of parenchymatous cellular tissue, in which the Graafian vesicles are placed. Each of these Graafian vesicles contains one or more ovula floating in the contained liquid. The process which takes place when ova are to escape from the ovarium may be shortly described as follows. A turgescence of blood is observed in the parenchymatous part of the ovary, and more especially around the vesicle from which the ovula is to escape. The quantity of fluid in the vesicle is next increased, by which means the vesicle is pressed near the surface of the ovary, and escapes along with the contained fluid, by means of a very small opening. In this class of animals, it is observed, that, unlike fishes, birds, or amphibia, the rupture of the sac containing the ovum arises from the increase of the quantity of fluid around the ovum, and not by the increase in the size of the ovum itself. Upon the escape of the ovum in all the mammiferous animals, whether this arises from impregnation or from any other cause, certain changes take place for the purposes of obliterating the cavity which formerly contained the ovum; and the results of these changes are, that a certain body is formed, which has received the name of *corpus luteum*. I have already had occasion to show in part first, that the term *corpus luteum* has been applied to bodies of very different kinds, which are found in the ovary, the result of which has been, that authors have been led to point out certain marks by means of which, to distinguish true from false *corpora lutea*.

Such, then, being the process which is followed in the different classes of animals for the obliteration of the cavity which contained the ovum, before describing the appearance of *corpora lutea* in the more common of our domestic quadrupeds, I shall make a few general observations upon certain peculiarities which are noticed in them from that of the human female.

GENERAL REMARKS ON THE CORPORA LUTEA OF THE LOWER ANIMALS.

Size compared with that of the Ovary.—*First*, then, it may be remarked generally, that the size of the *corpora lutea* of the lower animals is greater in comparison to the size of the ovary, than that of the human female. Thus in the cow, the *corpus luteum* is of such great bulk as to occupy fully about a half of the ovary. In the ewe a similar thing is noticed; but in this latter animal, where occasionally there are two *corpora lutea* found in the ovary, and in all those animals where there are several, as the pig, bitch, &c. the bulk of the *corpora lutea* occupies two-thirds of the ovary, even although the ovary is much increased in size. This, of course, does not depend upon any diminution in the quantity of ovarian parenchymatous tissue, but upon the compression and diminished bulk which it undergoes.

External appearance. Nipple-like prominence, &c.—Secondly, In our domestic quadrupeds, the recent *corpus luteum* very generally presents a prominent nipple-like body, with frequently a depression in its centre. See Plate IV. Fig. 3, representing this appearance in the pregnant ewe. This is a phenomenon of extreme rarity in the human female. The explanation of the prominence just mentioned will be readily understood from what has been already said regarding the process which takes place for the evolution of the ovule, and the remarks that have just been made regarding the greater size of the *corpus luteum* in the lower animals. The large size to which the Graafian vesicle is distended before rupture takes place, produces a great thinning both of the external membrane of the Graafian vesicle, and that part of the enveloping membrane of the ovary which covers the vesicle; consequently, when rupture takes place, and rapid formation of the substance of the *corpus luteum*, the vesicle is soon redistended to its former bulk by the *corpus luteum*, and it projects beyond the surface of the ovary in the form of a nipple-like body, in consequence of the compression which is exerted on it by the parenchymatous substance of the ovary.

External appearance. Nipple-like prominence, depression in centre.—The depression in the centre of this body points out the spot at which the ovule escaped. In the sow there is frequently a patulous opening, leading into a small cavity in the interior of the *corpus luteum*. This cavity is lined by the internal membrane of the Graafian vesicle, and its opening is formed by the junction of the internal membrane of the vesicle with the enveloping membrane of the ovary. When no opening exists, but there is a simple depression in its place, this depression is caused by the retraction of that part of the enveloping membrane of the ovary, to which the internal membrane of the Graafian vesicle has formed an attachment; and in consequence of the obliteration of which, the retraction has taken place. On cutting into the *corpus luteum* directly through this depression in the centre of the nipple-like protuberance, a white line is distinctly seen running from it into the irregular-shaped whitish coloured centre of the *corpus luteum*, and which is the remains of the internal membrane of the Graafian vesicle.

GENERAL REMARKS ON FALSE CORPORA LUTEA IN THE LOWER ANIMALS.

When considering previously the subject of false, spurious, or *pseudo-corpora lutea* in the human female, we were led to the belief that many of these bodies were formed in the human female during the period of menstruation. We then also took an opportunity of pointing out [*] the great similarity between the period of menstruation in the human female, and that of heat or desire in the female of the lower animals. Since the period that the observations referred to were written, we have had three opportunities of examining the uterus and appendages of females dying during the menstrual period. They all three died in the Royal Infirmary of Edinburgh of acute disease; and, for the examination of the uterus and appendages, I am indebted to the kindness of Dr John Reid. In one of the three, dark-coloured blood was found in the vagina, and the interior of the uterus and Fallopian tubes were also lined with it. In the other two, there was a considerable quantity of blood in the upper part of the uterus, and the mouth of it was filled with bloody, thick mucus. The Fallopian tubes were also filled with blood. In all the three there was a recent clot of blood in one or other of the ovaries, and in one case an aperture which communicated with the peritoneum. The clot of blood was close to the surface of the ovary in them all, but of very different sizes; in one case being about the size of a barley-pickle, and in another the size of a walnut. In two of them more than one clot was found, and these additional ones were of old standing, being of a yellow colour, with blood in the centre, or melanotic matter. In addition to these, however, five cases may be also adduced, which have been detailed in M. Gendrin's late work on Practical Medicine,[†] in all of which there is a rupture in the ovary leading to a cavity of irregular size, lined or filled with blood. This is presumed to be the remains of a ruptured Graafian vesicle.

I have also had several opportunities of examining the ovaries of the sow and ewe, killed during the period of heat, and in both these animals I found vesicles protruding from the surface, and in one specimen taken from the cow, which was supposed to be killed during the period of heat, the uterus, tubes, and ovaries were extremely vascular. In the one ovary there was an opening communicating with a cavity within it. This cavity was found filled with blood, and the ovarian tissue around this cavity was extremely vascular.[‡]

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[*] See Edinburgh Medical and Surgical Journal, No. 142.

[†] Traite Philosophique de Medecine Pratique. Par A. N. Gendrin. Paris, 1838-9. Tom. ii. pp. 18-21.

[‡] Dr Barry has mentioned some curious facts regarding the Graafian vesicles in the rabbit. He says, "that after the impregnated ova have been discharged from the ovary, some of the larger Graafian vesicles remaining unbroken, are frequently found to contain a considerable quantity of dark blood, which gives them the appearance of blackish spots. Such spots have been noticed by several authors, who supposed them to indicate the Graafian vesicles from which ova were destined to be expelled. It is not unusual, however, to find Graafian vesicles thus filled with blood, in cases when the escaped ova, in number, size, and local situation in the uterus forbid the supposition that more would have been discharged from the ovary." Thus, in a rabbit killed 108¼ hours *post coitum*, ten ova were found distributed throughout the two uteri, the number of incipient *corpora lutea* corresponded to that of the ova, and yet each ovary presented several large and unbroken Graafian vesicles filled with blood.—Barry's Researches in Embryology, Part ii.

During the period of menstruation in the human female, and heat in the lower animals, it would appear that similar changes take place in the ovaries; that there are prominent vesicles; that these are ruptured; that their cavities become filled with blood; and that, after a time, this blood changes its colour, and gives rise to the appearance of false *corpora lutea.* While this is one of the most common origins of the false *corpus luteum* in the lower animals, another very frequent one is the effusion of blood into the tissue of the ovary, forming the ovarian apoplexy. We have found small coagula of blood at almost every part of the ovary, and under all circumstances, unconnected with heat or conception; and even when the animal has been several months pregnant, these clots of blood soon change their hue, and become either yellow and firm, or melanotic throughout, or yellow and black in the centre. In the cow they not unfrequently assume a brick-red colour, with small dark or black points through them. I have also not unfrequently found cysts filled with a yellow caseous matter. These are occasionally found as large as true *corpora lutea,* but are easily distinguished by their consistence and structure, as well as by their general appearance. In all instances, too, they can be turned out of their cyst with the greatest ease, which cannot be done with a true *corpus luteum.*

Means of distinguishiny true from false Corpora Lutea in the lower animals.—The means of distinguishing true from false *corpora lutea* in the lower animals may be shortly stated to be that false *corpora lutea* have

First, An irregular form.

Second, No distinct central cavity lined with a membrane or a central puckering.

Third, No concentric radii, or lobular divisions.

Fourth, They can frequently be turned out of a distinct cyst, when the body will be found to be of a caseous consistence and appearance.

Fifth, They have not the same colour as the true body in the different animals.

§. I.—OBSERVATIONS ON THE CORPUS LUTEUM OF THE COW.

The only figures of the *corpus luteum* of this animal to which we can refer our readers are contained in Sir Everard Home's Comparative Anatomy. He has delineated in plate cxiii. figs. 2 and 3, a very beautiful specimen of this body in the cow, a short time after impregnation. As usual, however, the drawings are magnified representations of the objects, and are not coloured. In the accompanying plate, Fig. 1, is represented the *corpus luteum* of this animal about a month after impregnation. The figure is of the natural size, and was drawn a very short time after the ovary was removed. The period of impregnation was well known, and the size of the *fœtus in utero* corroborated the testimony; the same ovary at *a*, contained the *corpus luteum* of the former pregnancy, but disappearing. The *corpus luteum*, then, of the cow, from a very short time after impregnation,* up to an advanced period of utero-gestation, is much larger than the unimpregnated ovary itself.

Size.—We examined one specimen, the bisection of which measured 1¼ inch in its greatest diameter, and 1 inch in its smallest; generally they are a little smaller, and sometimes so small as 8 lines in the greatest, and 6 or 7 lines in the smallest diameter. The average size of about a hundred of the *corpora lutea* of cows, the section of which I have measured, gives 11½ lines for the greatest diameter by about 10 lines for the smallest. The above measurements have reference to the early states of pregnancy alone, up to the fifth or sixth month,—instances rarely occurring when we have an opportunity of examining the ovaries in animals killed, until after delivery. But we frequently have an opportunity of examining them at this time, when they are found considerably diminished in size, but still retaining the same appearance and colour as before. The late Mr Scott of Greenock, for some time previous to his death, was engaged in the investigation of this subject. He was at great pains to measure the size of the fœtus, and to compare it with the size and appearance of the *corpus luteum* in this animal. He was unfortunately cut off in the midst of his labours. The conclusions, however, at which he had arrived, I have been able to procure, having had an opportunity of consulting his notes.

Thus the *corpus luteum* of the cow was about the same size, when the fœtus weighed

Weight of Fœtus.			Length of Fœtus. From Cervix to Ischium.	From Cervix to Umbilicus.	From Umbilicus. to Ischium.
1 oz.	4 dwt.	25 gr.	2⅜ in.	1³⁄₁₆ in.	1¹⁄₁₆ in.
5	6	45	3⅜	2	1¾
3	1	0	3⅛	1¾	1⅜
4	7	0	3⅜	2¼	1⅜
1	0	10	2⅜	1⅛	0⅞
4	7	11	3⅜	2¾	1⅜
0	4	56	1⅞	1¼	0⅞
2	1	40	3	1⅜	1¼

Central Cavity.—It would appear from the statement made by M. Burdach, that the central cavity exists in every case at twelve days, and is about the size of a pea at that time. We have seen it much larger at a more advanced period of pregnancy, and have delineated one, Fig. 2. It is probable that in some cases this cavity is very early obliterated, and in others persists unusually long.

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* We say a very short time, as we have not been able to see it and trace it in its very early stages in this animal. Burdach says, that in cows, the cavity in the *corpus luteum* is still the size of a pea at twelve days, and its walls have a yellowish red and flocculent appearance.

Colour.—It was stated in part first of these observations, that the colour of the *corpus luteum* in the human subject varies according as it is examined at different periods, and also varies in different individuals. Thus, when the human *corpus luteum* is forming or newly formed, it has a red colour, and occasionally throughout pregnancy and even after delivery, a pinkish hue. Yellow, however, is the colour most commonly seen, and hence its name. The same observation applies to the *corpus glandulosum* or luteum of the cow. In this animal, the most common colour is a bright orange yellow, which colour even shines through the coverings of the ovary, and when a section is made of the ovary which contains it, the contrast with the ovary itself is great and striking. The colour of this body, however, although most frequently, as described above, certainly has not the orange hue, when the *corpus luteum* is forming or just formed, and I have occasionally seen it of a pinkish yellow hue during the course of pregnancy, and even at an early period of utero-gestation. On what this difference depends, it is impossible to say; but it certainly makes a difference upon the colour which the *corpus luteum* assumes when disappearing from the ovary.

MANNER IN WHICH THE CORPUS LUTEUM DISAPPEARS, AND COLOUR WHICH IT ASSUMES IN THE PROCESS OF ABSORPTION.—The manner in which this body disappears from the animal under consideration, is to be explained in the same way as has been already done, when speaking of the manner in which the human *corpus luteum* disappears from the ovary. I then endeavoured to show, that the *corpus luteum* consists of a lymphy effusion between the two coats of the Graafian vesicle which separates the internal from the external membrane, by the thickness of the *corpus luteum*; the internal membrane either remaining entire in the shape of a cavity, or becoming puckered up, and forming the central cicatrix, while the external remains exterior to the proper *corpus luteum.* I at the same time explained that the manner in which this body disappears, is, by the absorption of this lymphy deposit, and consequently the re-approximation of the two coats of the Graafian vesicle, leaving as the last vestige of a *corpus luteum* in the ovary, a small cyst or puckered cicatrix. The same remarks apply precisely to the animal under consideration. When a central cavity has existed from the first, and has remained during pregnancy, an instance of which is delineated, (Fig. 2,) the proper substance of the *corpus luteum* is absorbed, and a cyst left as above described. Most frequently, however, in this animal no central cavity has existed, the internal membrane being thrown into innumerable curious foldings over the lobules of the *corpus luteum*, as is seen in (Fig. 1.)

In such cases, as the substance of the *corpus luteum* becomes absorbed, these irregular striæ become more visible, and, in consequence of the diminished quantity of the glandulose substance, gradually assume the appearance of a central, puckered, and extremely irregular cicatrix. In disappearing, the colour of the *corpus luteum* in this animal varies; assuming sometimes a pinkish hue, but most frequently a brick-red or reddish yellow.

We can say nothing of the period at which this body disappears from the ovary of the cow, in consequence of the animals being killed for the market, and little being known of their history; and it is always necessary to sift to the bottom whatever information we obtain, before any reliance can be placed upon it.

§. II.—OBSERVATIONS ON THE CORPUS LUTEUM OF THE EWE.

The ewe is one of the most readily accessible of all our domestic quadrupeds, for the purposes of experimental inquiry on the formation of the *corpus luteum* and development of the embryo. It goes four months with young, producing one, two, or more, rarely three and four, at a birth.

We find that, in consequence of the ease with which this animal can be procured for experiments of the kind, many of the ancient authors founded their doctrines on the examination of no other animal but itself; and we have many elaborate series of experiments, as concerns not only the *corpus luteum*, but also the evolutions of the embryo, by Haller, Kuhleman, &c.; and in our own day by M. Coste and others. We have also directed our attention, in an especial manner, to the appearances of the *corpus luteum* in this animal; and we have had abundant opportunities of studying those appearances throughout almost every stage of pregnancy, from one or two days after impregnation, up to the full period of pregnancy, having twice examined the uterus and appendages of ewes killed for the market, in whom the lamb was taken out of the uterus alive, and lived afterwards.

Appearance of the Corpus Luteum at different periods of Pregnancy.—It would appear from the observations of different experimenters, that the Graafian vesicle of the ewe is not regular as to the period after conception, at which rupture takes place. Haller[*] found the vesicle ruptured in one instance so soon as ninety minutes after conception, and always after two hours. Kuhleman may also be mentioned as testifying the same thing. It is rather remarkable, however, that the vesicle in the sheep should burst so soon, seeing that in other animals, as the bitch, rabbit, &c. the interval between conception and rupture of the vesicle is much greater.

In the ewe, the formation of the *corpus luteum* does not appear to begin till about five hours after conception, and the commencement of it at that time is thus mentioned by Kuhleman. [*] "Vesiculam incipisse crassescere. Per id ostium caveam vesiculæ inflavi. In ea flocculi laceri cellulosi, et in ostio glutinosi quid et cruenti, tum in superficie ovarii, et circa tubæ fimbrias." The opening from the vesicle into the peritoneal cavity now closes, and the formation of the *corpus luteum* goes on rapidly. At twenty hours after conception in the ewe, we find Haller describes the appearance of it to be, "Rubrum inflammatum, de membrana ovarii eminens fissum. Membrana vesiculæ in ovarium mutatæ nunc crassior, et flocculi in cavea majores, in acinos increverant. In cavea mucus et striæ sanguineæ."

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[*] Haller's Opera Minora, Vol. ii. p. 427.

The changes which now take place may be shortly described to be as follow. The acini or fleshy projections, from the interior of the vesicle, gradually enlarge, until they entirely fill up the cavity. Haller found the cavity almost entirely filled up at seventy-two hours after conception. We have already explained that the substance of the *corpus luteum* is effused between the external and internal membrane of the Graafian vesicle; therefore, in consequence of the extreme delicacy of this internal membrane, it was not noticed by Haller to cover the acini or fleshy projections which he describes. That it does, however, is easily demonstrated, and has been already done in the first part of these observations. It is this delicate internal membrane which gives rise to the light-coloured striæ or divisions which are noticed to divide the lobuli of the *corpus luteum* in those cases where no central cavity exists. But it is still more distinctly seen when this does exist. In such cases, there always appears to have been a greater quantity of fluid effused into the cavity of the vesicle than takes place where no cavity remains, and also a quantity of lymphy effusion on the internal surface of the internal membrane, which considerably thickens and strengthens it. When this cavity does exist, it remains throughout the greater part of pregnancy; and we have frequently seen it filled up by numerous lymphy subdivisions or flocculi.

Colour.—The colour of the *corpus luteum* in this animal, when it is completely formed, is generally of a dull fleshy red, and occasionally of a pinkish or yellowish red. See Plate IV. Figs. 4 and 5.

The size is various, being largest immediately after the complete formation of the body, and decreasing gradually till the termination of pregnancy. It is astonishing, however, how little difference takes place upon it during the course of pregnancy, much less, we would say, than on that of any other animal with which we are conversant.

We instituted a series of experiments to determine the rate of decrease which took place on the *corpus luteum* during pregnancy, thinking at the time that the same would hold good with regard to other animals. We preserved a series of specimens which showed this body at about every week from impregnation to mature pregnancy. From these data, we were enabled precisely to ascertain the size of the *corpus luteum*, at different stages of pregnancy, and also to estimate any decrease of size which might take place. Thus, we have found the average size of the *corpus luteum* in the ewe, about fourteen days, three weeks, or a month after conception, to be about six lines in diameter, while at an advanced period of utero-gestation, it is about four lines in diameter. The largest size which we have found it in the ewe was nine lines in diameter. It may be said, generally speaking, to be about the size of a horse-bean or large pea. The size of the *corpus luteum*, in comparison to the size of the ovary, is very great, occupying nearly the whole of it; and where two exist in the same ovary, the size of the organ is considerably increased, while its proper substance is much compressed.

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[*] Op. cit. p. 428.

The same series of specimens, which we have mentioned above, enables us to speak regarding the frequency of a central cavity. We have only found it about 8 times in 100 cases; and so little is it to be relied on, as at all indicative of the relative age of the embryo, that it is frequently completely obliterated before the embryo has reached the uterus; and we have seen it (probably oftenest) when the fœtus was the size of a bean. We have also seen it existing in one *corpus luteum*, and not in the other, when there were two *corpora lutea* in one ovary, and when of course the embryos were of the same age.

The *corpus luteum* rapidly decreases in size, after the delivery of the animal, and not unfrequently becomes more lengthened in its shape, in consequence of enlarged Graafian vesicles, or new *corpora lutea* pressing against it. We shall have occasion to mention and explain this circumstance more particularly when we speak of the ovary of the pig.

It appears to me, however, that, even although they have assumed a more lengthened form, they may always be detected upon minute examination. When examined by means of a strong lens, they will be observed to possess some delicate central radii or lobular subdivisions, similar to what is seen in the recent body. The colour after delivery becomes of a much duller and darker hue, more of a brick red.

False Corpora Lutea.—It would appear that Haller was in the habit of distinguishing between the remains of true *corpora lutea*, and the false bodies found in these animals. He says of his experiment XIV. "In eodem ovario, corpus luteum vetustum, et vesiculae septem : sic in altero ovario duo vetusta corpora lutea, et octo vesiculae;" and of Experiment XVI. "In altero ovario etiam corpus luteum vetustum, et duo puncta fusca cum sex vesiculis;" and again in XIX. "In ovario hydatis grandiuscula et tris puncta fusca."* From these it would distinctly appear that Haller not only considered it possible, but was in the habit of pointing out the difference between the remains of true *corpora lutea*, and those yellow bodies or *puncta fusca*, which, in general, take their origin from apoplectic effusions into the substance of the ovary.

The only forms of false *corpora lutea* which we have noticed in this animal, would seem to have originated, either in small apoplectic effusions into the tissue of the ovary, or from rupture of a vesicle, and effusion of blood at the season of heat. The former may generally be distinguished at an early period, by its dark, bloody, red colour, and afterwards by its rapidly assuming a yellow tint, (puncta fusca of Haller) ; the latter, or the effusion of blood from the rupture of a vesicle, can always be recognized by its semicircular or irregular shape. It possesses, however, more of the colour of the true *corpus luteum.* In addition to these marks, however, no trace of central radiation or lobular arrangement is ever found in the false bodies, and they have always a much more irregular shape. We shall also generally find the remains of true *corpora lutea* placed near the periphery of the organ, while those false bodies occur most frequently towards the centre, or in the substance of the ovary.

§. III.—OBSERVATIONS ON THE CORPORA LUTEA OF THE SOW.

This animal also has frequently been made the subject of experimental inquiry both by ancient authors and those of the present day. Haller has related several experiments which he performed on this animal, and Sir Everard Home, in his work on Comparative Anatomy, has not only described the *corpus luteum*, but given delineations of it in the pig.

Appearance of the Ovary during heat, and of the Corpus Luteum in its recent state.—The ovary of the sow when young, and before it has reached the age for breeding, is about an inch or so in length, and having numerous small vesicles projecting from the surface. As the breeding period arrives, however, and more especially when the animal is in heat or season, the whole size of the ovary is much enlarged, and the small vesicles which previously projected from the surface become extremely prominent and much enlarged. We had lately an opportunity of examining the uterus and appendages of a sow killed during the period of heat. It had had one litter of pigs, had not been near the boar, or even in sight of one from the time of its previous litter. The uterus and appendages of this animal were of large size, and of darker colour than in their ordinary state. Upon cutting into the uterus, its internal membrane was found of a dark-red or purplish colour, this redness being caused by numerous small and tortuous vessels filled with blood. The same redness extended throughout every part of the uterus and its cornua, and also into the Fallopian tubes of both sides.* Both ovaries were very large, and had numerous vesicles protruding from the surface, some of which were about the size of a large pea, others of a good sized marble. Three of the largest in the one ovary had been ruptured, the fluid having escaped by an extremely minute orifice, so that the vesicle had collapsed. In this way a cup-like cavity was formed in three points of the ovary, into which the point of the little finger could be easily introduced. The whole surface of the ovary was extremely vascular, and on making a section of it through some of the enlarged vesicles, and through two of those that had already burst, no appearance of the formation of *corpora lutea* could be discovered. The internal membrane of all the enlarged vesicles was extremely soft and gelatinous, but no bloody effusion was noticed either around them or between the membranes of the vesicle, and no lymphy projections were to be observed within the vesicle. The remains of the former *corpora lutea* were still visible, and the central puckering could be easily discerned in them all; they were five in number.

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* Haller's Opera Minora, Vol. ii. p. 428–9.

The period after impregnation at which the vesicle of the sow bursts to allow the escape of the ovule is not precisely known. Hausmann says that he never found the ova of the sow in the uterus before the period of four weeks had elapsed after conception. Dr Allen Thomson, however, has cautioned us against the error of considering that in the sheep, sow, and other animals, because the ova have not been seen in the uterus, they do not actually exist there previous to a certain date; for the ovum on its descent into the uterus is so minute that it is not easily discovered, and is very likely to have been passed over by experimenters of the time of Hausmann. The formation of the *corpus luteum* in this animal is beautifully seen about twelve to fourteen days after impregnation. In such instances the ovarium is found externally like a bunch of currants. It is extremely vascular, and frequently openings are found leading into the centre of the *corpora lutea*. Upon a section being made of the ovary, these bodies are generally found (about fourteen days,) with a hollow centre; this central cavity being most frequently filled with dark-coloured blood, and lined with a distinct membrane. This membrane, which is the internal membrane of the Graafian vesicle, is extremely delicate, and is frequently continuous with the external membrane of the ovary. The substance of the *corpus luteum* at this time is of a lightish red colour, with numerous minute vessels ramifying through it and carrying red blood. It has numerous lobuli pressing in towards the centre in an irregular manner. The substance of the *corpus luteum* is extremely soft at this time. The *corpus luteum*, however, of this animal, when completely formed, is of a roundish shape, generally about the size of a horse bean.

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* It ought to be mentioned that this animal was bled to death, and that, even although the vascularity of the uterus and appendages was great after death, it would have been much greater, had the animal been killed in any other way in which the blood would have been preserved within the body.

Colour.—It has a light red or reddish colour " subrubra," as Haller calls it, or orange red " e flavo rubens," very similar, indeed, to the human, with numerous lighter coloured irregular striæ running through it. These are the remains of the internal membrane of the Graafian vesicle, and lymphy effusion along with it.

The number of *corpora lutea* in each ovary amounts to from three to fourteen;* and in general† are found to correspond with the number of fœtuses in the uterus. Not unfrequently in this animal the *corpora lutea* are so pressed together that two of them assume the appearance of one, as will be seen in Fig. 8; and this affords a very good illustration, of the appearance of a pretty thick membrane, (and in this case two folds of it,) when pressed on all sides by the *corpus luteum*, almost loosing entirely the appearance of a membrane. This we have frequently noticed, and have had difficulty in distinguishing in this animal whether it was one *corpus luteum* or two conjoined. In one instance it was so impossible to tell this, that we had recourse to the number of fœtuses *in utero*, and found it then to be a double *corpus luteum*. If we occasionally mistake two folds of a thick membrane, like that of the external one of the Graafian vesicle, how much more liable shall we be to overlook its internal membrane, when puckered up over the innumerable acini or projections of the interior of a *corpus luteum*?

Changes which the Corpus Luteum undergoes throughout Pregnancy.—As pregnancy advances, the *corpus luteum* of the pig becomes gradually firmer in its texture, and a certain diminution takes place in its size. This, however, is trifling; but upon the completion of pregnancy, they are rapidly absorbed, and soon leave no remains whatever in the ovary, by which the former *corpus luteum* can be detected. We have seen, however, their remains distinctly visible, at between two and three months after delivery, and bearing the marks which we have formerly described as distinguishing true from false *corpora lutea*.

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* Haller's op. cit. p. 447.

† It has been shown by Haller, Baer, Coste, Montgomery, Dr Allen Thomson, and others, that the number of *corpora lutea* may not precisely correspond, although they in general do so; as when two ovula exist in one Graafian vesicle, of course only one *corpus luteum* is formed upon the impregnation of that vesicle, or when one or more of the ovula are blighted either before or after their entrance into the uterus, but when they are still so small as not to be easily discovered, unless with the greatest care.

§. IV.—OBSERVATIONS ON THE CORPUS LUTEUM OF THE BITCH.

This animal has very frequently been made the subject of experiment from Haller's time down to the present day; and it is now generally looked upon as the animal best calculated for making observations on the processes connected with generation, not only from the facility with which it is procured, but also from the precise way in which the period of impregnation can be determined. The ovaries of this animal are about the size of large beans.[*] They contain numerous vesicles of small size, each enclosing a clear fluid. There is a considerable increase in the size of one or more of the vesicles of this animal during the season of heat; but upon the occurrence of impregnation, they enlarge much, and are generally found ruptured about the seventh or eighth day after impregnation.[†]

Like what has been observed in other animals upon examining the interior of a vesicle which has just been ruptured, and allowed its ovule to escape, the interior of it is generally more or less filled with bloody-looking serum, and a certain number of extremely soft villosities on its surface. These villosities rapidly increase and project into the interior of the cavity, and soon fill it up. This is the manner in which the *corpus luteum* is formed. At the end of eight days after impregnation, the *corpora lutea* of this animal, are generally found well, if not entirely formed. Occasionally, however, they still retain a central cavity, and in such instances, and about this period after impregnation, we have excellent opportunities of examining the position of the *corpus luteum*, as regards the external and internal membrane of the Graafian vesicle. The internal membrane will generally be found lining the cavity if this does exist, and having lymph effused on its internal surface, which can be separated, (with a pair of delicate forceps) into numerous thin shreds.

Colour.—The *corpus luteum* of the bitch is of a pinkish yellow colour, and as pregnancy advances, it becomes gradually yellower; and firmer; and smaller; and we have seen it about a month after delivery, in the shape of a small firm yellow body.

Size.—The size of the *corpus luteum* in this animal may be compared to that of an ordinary sized pea; but, like other animals, it varies a little in its size, being sometimes larger and sometimes smaller.

§. V.—OBSERVATIONS ON THE CORPUS LUTEUM OF THE CAT.

The *corpus luteum* of the cat has a dingy yellow hue, with occasionally red vessels running through it. They are about the size of a grain of wheat, or ordinary vetch seed.

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[*] Prevost and Dumas, Tom. iii. p. 114.

[†] Haller found the vesicles burst before the sixth day; but Prevost and Dumas, as well as many other experimenters, never have found this before the seventh or eighth.

It is not advisable to choose this animal for experimental inquiries of the present nature, as it is extremely difficult to ascertain the precise period of impregnation, in consequence of the aversion of the animal to copulate in the presence of any one, or when shut up for that purpose.

§. VI.—OBSERVATIONS ON THE CORPUS LUTEUM OF THE RABBIT.

This animal has been made the subject of experiment on the formation of the *corpus luteum* by individuals, both ancient and modern,—by Haller, Cruickshank, and Haighton, Blundell, Prevost and Dumas, and many authors both in this country and the Continent; and we have, consequently, observations on the appearance of the Graafian vesicle throughout all its stages, down to the complete formation of the *corpus luteum*. It would be needless here to repeat the observations of different experimenters on this subject, as I have already gone over the same ground, when describing the appearance of this body in the ewe and other animals. Suffice it to say, that the ovary, uterus, and appendages, become gorged with blood during the period of heat; that certain vesicles become prominent, and at a certain period after impregnation burst and discharge their contents. Cruickshank found in some of his experiments vesicles burst two hours after coition. Haighton, however, and M. Coste do not agree with him. The former says, forty-eight hours is the general time, and the latter says, between the second and third day. The formation of the *corpus luteum*, however, commences thus. A vesicle is first found filled with blood or bloody serum, then, projections arise from the uterine surface of it; the opening through which the vesicle escaped now closes, and the formation of the *corpus luteum* goes on rapidly. A central cavity not unfrequently exists within the substance of the *corpus luteum* for a few days, and is then filled up.

Colour.—The colour of the *corpus luteum* in the rabbit, is of a dingy yellow, very like that of the cat. They are of very small size, a good idea of which may be formed from the inspection of the plate.

Concluding Remarks.—I have thus considered the appearance and size of the *corpora lutea* in the more common of our domestic animals, to which has been added some facts connected with the formation of this body in the different animals, and the distinguishing marks between it and the numerous false bodies which are so frequently to be seen in the ovarian structure. I have been obliged to leave out the consideration of the appearance in many animals which may occasionally fall under the observation of the reader, as the mare, the deer, guinea pig, &c. The difficulty of procuring the two former, for the purposes of an experimental inquiry of the nature of the present, and the little difference which is to be found between the appearance in a guinea pig and the rabbit, have induced me to leave this out of consideration. In the course of the inquiry, therefore, I have endeavoured to point out, 1*stly*, The general appearance which the *corpora lutea* of different animals present at the different stages of maturity; 2*dly*, The distinguishing marks which characterize them; and 3*dly*, The appearance which false or pseudo *corpora lutea* present, and the manner in which they are to be distinguished from the true bodies, and from the remains of them.

Explanation of the Plate.

Fig. 1. Ordinary appearance of the *corpus luteum* of the cow a short time after its complete formation.

Fig. 2. *Corpus luteum* of the cow at a more advanced period of pregnancy, still retaining its central cavity.

Fig. 1. *a*. Fig. 2. *b*. The ordinary appearance of false *corpora lutea* in this animal.

Fig. 3. External appearance of the ovary of the ewe, showing the nipple-like prominence, the central depression, and inflammatory blush around it.

Fig. 4. Section of the ovary of the ewe, in which two *corpora lutea* were found.

Fig. 5. Ordinary appearance of the *corpus luteum* of this animal.

Fig. 4. *a*. Fig. 5. *b*. Show the ordinary appearance of false *corpora lutea* in this animal.

Fig. 6. External appearance of the ovary of the sow a short time after impregnation.

Fig. 7. Section of the same, showing the central cavity, still communicating with the peritoneum.

Fig. 8. Ordinary appearance of the section of the ovary of this animal during pregnancy.

Fig. 9. 10. 11. Show the appearance of a section of the ovary in the bitch, cat, and rabbit.

ART. VII.—*Case of dangerous Uterine Hemorrhage in which Transfusion was successfully employed, with some observations on the more frequent expediency of that operation.* By RICHARD OLIVER, M. D.

ON the 26th of June 1837, I was called to attend the wife of John Cook, a weaver, living at Eden Place, about a mile from my house. She had been attended by a midwife, and had given birth to a child at its full time in the course of the previous night. The patient was about 42 years of age, and this was her seventh child. I found her at 6 A. M. in an exceedingly exhausted condition. Blanched by a profuse hemorrhage, which no adequate means had been employed to suppress, but which had now ceased, she was lying on her back in a state of imperfect consciousness, with the pulse at the wrist barely perceptible, now and then moaning lowly, and casting about her arms. About half-a glass of rum with a litle water was immediately given to her, and this, with a few spoonsful of beef-tea, was repeated two or three times at intervals of about twenty or twenty-five minutes. After each dose she appeared to be a little refreshed, but upon the whole the symptoms of collapse were gaining ground. About half-past 7 o'clock brandy was substituted for the rum, and the dose was increased to an ounce and a-half, with the addition of a drachm of aromatic spirit of ammonia and a few drops of tincture of opium to every second or third portion. The same deceitful promises of reaction were succeeded by the same progressive indications of sinking, until at length, about one P. M., she became quite unable to swallow. The pulse at the wrist and in the carotids had not been perceptible for more than two hours and a-half, and the coma was now complete. Under these very unpropitious circumstances I determined upon transfusion, with little hope of success, and with no small compunction for having thus afforded the operation so little fair play. At half-past one P. M. I was provided with the apparatus necessary for performing it; and having obtained a willing supply of blood from three of the patient's kind-hearted neighbours, I opened a vein at the bend of her arm, and, with the assistance of two of my professional friends, Mr Bowman, surgeon of this place, and Dr Henry Lonsdale, now Demonstrator of Anatoty in Queen's College, Edinburgh, I proceeded cautiously and steadily to introduce it.

I had first taken care to see that the instrument was in proper order, and particularly that I should have the syringe and its tubes free from air. After one or two gentle strokes with the piston, made with a view to ascertain this point, I found that the cup attached to the apparatus was so small that it could not be safely used. Unless the piston was elevated very slowly, and the blood was supplied very steadily to the cup, there was great risk of introducing air into the cylinder. But finding that, by taking a common basin to receive the blood, and by drawing it up thence through the bottom of the syringe, I could obviate this danger, I laid the cup aside altogether. With this simpler arrangement I passed syringeful after syringeful into her exhausted veins, pausing from time to time to mark the effects, and anxiously watching for some glimmering promise of the return of energy to her heart. On a moderate computation we had already transfused twelve ounces of blood, and she still lay pulseless and perfectly insensible. The respiration, however, although faint and low, was distinct and regular; so that, however small the amount of blood in her system might be, there was still some undergoing aeration in the lungs; and in gradually augmenting its quantity, we might possibly contribute to raise her vital powers, by enabling a larger portion of it to reach the nervous centres. We could not discern the heart's pulsations, but we might be quite certain that it did beat, and that the general circulation, although thus imperceptible, was still actually carried on. We had yet obtained no assurance of improvement, but it was pretty evident that, by proceeding cautiously, we neither had done, nor could do any harm. Without this expedient the poor woman's death was inevitable, and but too probable, we then thought, even with it; so, disregarding the cautions given upon this point, we determined to go on. Steadily and slowly the blood was introduced as before, until at length we imagined that the pulse became faintly perceptible in the arm; and slight as it was, this intimation of the heart's increased power gave us no small encouragement. After persevering for a few minutes longer, we had the very perfect gratification of witnessing not only the complete restoration of the circulating power, but the return of consciousness, and of the ability to speak.

It is unnecessary to advert to the subsequent details of the treatment and of the recovery, farther than to mention that she went on very favourably, and in a few weeks was moving about in her family as usual. She remained for some time longer rather weak and delicate, but beyond an occasional slight headach, and a tendency to constipation and flatulence, she suffered from none of the more prominent and distressing symptoms which ordinarily ensue after serious losses of blood, and she has long been, and still remains, in very good health.

With respect to the quantity of blood introduced in this case, I am not able to speak with absolute accuracy; but I feel quite certain that I am below the mark in mentioning twenty-two ounces. From each of the three individuals who supplied the blood, we took at the least an average of twelve ounces; and although we did not attempt to measure the amount of it, I am perfectly satisfied that, at all events, not more than one-third of the whole was lost by coagulation, and by being thrown upon the ground in adjusting and preparing the instrument.

In looking over a few of the observations that have been made upon the subject of transfusion, I have been struck with the reasons which are assigned for the directions given as to its performance. Apprehensions are expressed lest the power of the heart should be overwhelmed by too sudden or too copious a supply of the borrowed fluid,* and lest the exhausted system should be unable to appropriate it; and as the first circumstance is not only conceivable, but quite possible,† the apprehension may be to a certain extent a just one. But there can be no reason for allowing this consideration to deter us from making a fair use of the remedy; and I am very much inclined to think that want of success may have resulted from too highly estimating this supposed hazard; for although cases of its failure may not have been unfrequent, I have not yet been able to meet with any proofs of its ever having been positively injurious. The merits of the operation, I believe, have not yet been fairly tested. The whole of the symptoms immediately consequent upon excessive hemorrhage, whether those which present themselves in cases of leipothymia from any other cause be so or not, are referable, I presume, for the most part, to a diminution in the supply of arterial blood to the cerebro-spinal axis; and, certainly, when the vascular system has thus suffered an enormous draining, it is almost needless to say that there can be no more direct and obvious mode of counteracting the consequent mischief, and of restoring or upholding the supply of nervous influence which is requisite for the sustentation of life, than to refurnish that system with blood. So long as the respiration continues regular, however feeble, and, which I take to be only another form of expression for the same thing, so long as the right cavities of the heart are able to forward blood to the lungs in a corresponding ratio, that blood will be made fit for its office, and every drop added to the arterial current will augment by so much the probabilities of eventual success, provided the symptoms are merely those of inanition, and that no incurable lesion has pre-existed, or has been produced by delay.

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* "But if too large a quantity be injected, it may so oppress the right side of the heart, as to impede the circulation."—Mr J. H. Green in Lancet of December 12, 1829. Vol. i. page 372.

† This had been noticed by former observers; but is well attested by Dr John

Although the persistence for a short time of the heart's power of action, particularly that of the right auricle, after the irritability of the rest of the system has ceased, is such as to have obtained for that viscus the designation of *ultimum moriens;* it is not less certain that the exercise of that power is essentially dependent upon the presence of its natural and appropriate stimulus; and the influence of a vast variety of circumstances in modifying its action completely shuts out the opinion advocated by Haller,[*] that its motion is solely the result of a property exclusively appertaining to itself, and not in any way dependent upon the condition of the nervous system. In any case, therefore, where the blood is dangerously deficient in quantity, transfusion would appear to be available, not merely in the way of supplying the heart with that direct stimulus which is indispensable for its immediate action, but also by maintaining its contractility through the sustained energy of the nervous centres; and the case which I have

Reid in his article on the Heart in the Cyclopædia of Anatomy and Physiology, Vol. ii. page 608.

[*] "Is motus est insitus, nec a cerebro advenit, nec ab anima, cum in mortuo animali, cum in corde de pectore avulso supersit, neque a voluntate aut incitari possit aut tardari."—Haller, Primæ Lineæ Physiologiæ, Sect. cii.

just related may serve at least to show from how low a pitch the powers of the system may be effectually raised, when ordinary means have proved unavailing, whilst even thus finely spun, the thread is yet unbroken which connects the inter-dependent functions of the heart, lungs, and brain.

The scepticism which insinuates that recoveries might have taken place in many instances whether the operation had been resorted to or not, expresses but a negative objection to its use; and we have yet to learn that the cautious introduction of blood can lessen the chances of recovery when the balance is thus dubiously wavering between life and death. In those cases where a very small amount of blood has been found sufficient to turn the scale, and where it is not improbable that the patients might have rallied without such assistance, the only philosophical objection that has yet been raised against the practice, viz. the risk of oppressing the enfeebled heart, must well nigh have reached its vanishing point; whilst instances such as that which I have detailed sufficiently attest its value under circumstances of a widely different character.

Believing that a very erroneous estimate has been put upon this operation, and that its alleged risks have been greatly exaggerated, I am anxious to see it placed upon a footing where the advantages which it really presents may be fairly dealt by, and to hear of its being more frequently resorted to in those fearful cases which but too commonly occur, particularly in obstetrical practice, to peril, it may be, some life of more than ordinary moment, and to harass the mind of the medical attendant with an anxiety almost insupportable. I cannot help thinking that if the measure were adopted with less hesitation, and much earlier than has been usual, there would be less of this. But whilst practitioners, on referring to authoritative systematic works for information upon this subject, meet with little more than doubts as to its expediency, or something like a specious pretext for mistrusting it, it is not likely that we shall speedily hear of its coming into anything like general use; unless, indeed, Dr Blundell should resume its advocacy, or Dr Ferguson, or some other practitioner possessing ample opportunities for observation, and proceeding with a reasonable boldness, should determine on data sufficiently complete, the exact amount of credit due to it as a therapeutical agent.

Dr Davis, in his Obstetrical Medicine, states, that "experience appears to sanction the presumption that the capacity of the arterial system, considered in connection with its influences on the nervous and respiratory systems, is much too limited to make it probable that it should ever, by any variations or modifications of future trials, be brought to admit and to adopt for its own purposes, within the period of an hour, or even of some fractional proportion of that time, sufficient quantities of foreign blood to insure the recovery of one woman in a hundred, and so serve eventually to promote the re-establishment of the practice of transfusion."—P. 1066.

Now when we find in a work of this imposing character, where we might expect to meet with something like sound reasoning on a subject of this kind, that a vague presumption is thus put in the place of a legitimate philosophical inference, it cannot be denied that the merits of the remedy have been prejudged.

Mr Lizars, on the other hand, in his System of Practical Surgery, says, after describing the mode of performing the operation, and mentioning one or two drachms as the quantity to be introduced, "the blood thus propelled into the exhausted circulating system re-excites the heart, and puts the springs of life into action. It is only necessary to inject a few drops of blood to stimulate the heart; and probably the saline solution, which was so extensively and so beneficially used in cholera, is preferable to human blood."—P. 126.

This is, no doubt, a more encouraging view of the matter; but if it were found on proof that "a few drops of blood" did not generally "stimulate the heart," and that even "a drachm or two" very frequently failed "to put the springs of life into action," the reputation of the remedy would be more apt to suffer eventually from the false expectations which such an inconsiderate assertion is calculated to excite, than from any direct hostility to its employment.

If I should ever again have occasion to resort to this operation, I would use a much simpler instrument than that which is termed the transfusing apparatus, and one which might very conveniently be in the hands of every practitioner. A small curved silver tube for insertion into the vein, having a transverse flat collar to keep it steady, is of course indispensable. To this a light, straight, brass stop-cock should be adapted; and, when required, a soft bladder tied upon the end of the stop-cock would serve for the reception of the blood. Mr Syme, I believe, recommends something like this in his Elements of Surgery. In this way the blood could readily be pressed downwards into the vein, without any risk of introducing air. The advantage of a pocket instrument of this kind over the more cumbrous and elaborate machinery which very few people are in possession of, and which is not unlikely to be at an inconvenient distance when most urgently wanted, is sufficiently obvious; more particularly as its constant readiness would very probably lead to its more frequent use.

Carlisle, June 12, 1840.

PART II.

CRITICAL ANALYSIS.

Art. I. — *Observations on the Variolæ Vaccinæ, as they occasionally appear in the Vale of Aylesbury, with an account of some recent experiments in the Vaccination, Retro-vaccination, and Variolation of Cows.* (Illustrated by Coloured Engravings from Original Drawings.) By Robert Ceely, Esq., Surgeon to the Buckinghamshire Infirmary. (Transactions of the Provincial Medical and Surgical Association, p. 287–434. 8vo. London, 1840.)

Since the antivariolous powers of the cow-pox were first brought before the notice of the public by Dr Jenner, it has been an object of inquiry to ascertain the relation in which it stood to small-pox, in order to account for its very singular property of steeling the constitution against the attacks of that loathsome disease. It has been very generally admitted, that there are particular diseases which occur only once during life, and which, effecting some unknown change in the system, protect it from subsequent attacks of the same disease. When Dr Jenner, therefore, discovered that vaccine inoculation undoubtedly possessed the property of preventing an attack of small-pox, and found, besides, that these two diseases had many characters in common, he was led to conclude that they were but modifications of one another. Nay more, having traced the cow-pox to have arisen in many instances from the communication of the matter of grease from the horse's heel, to the udder of the cow, he ventured to assume, that even small-pox itself might have been originally derived from the horse. "May it not then," says he, "be reasonably conjectured, that the source of small-pox is morbid matter of a peculiar kind, generated by a disease in the horse, and that accidental circumstances may have again and again arisen, still working new changes upon it, until it has acquired the contagious and malignant form under which we now see it making its devastations among us?"[*]

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[*] Inquiry into the causes and effects of Variolæ Vaccinæ, &c. By Edward Jenner, M. D., F. R. S. &c. 4to. London, 1798. P. 52.

Dr Woodville,[*] Mr Coleman,[†] Professor at the Veterinary College London, and Mr Simmons,[‡] made experiments with the view of ascertaining how far the views of Dr Jenner were correct; but all these experimentalists failed to produce any disease like cow-pox, either with the matter of grease from the horse's heel, or with the small-pox virus itself, though these were carefully inserted into the udder of the cow by inoculation. Mr Simmons also inoculated several children with the matter of grease, but no result followed, and the children were afterwards successfully inoculated with the small-pox virus. The conclusion, therefore, at which these experimentalists arrived was, that the cow-pox poison did not originate from the matter of the diseased heel of the horse, and that small-pox was not communicable to cows. Dr Woodville, however, independent of these and many other distinctions, thought that "we have abundant evidence to show that the cow-pox and small-pox are closely allied, and the effects of the former, by preventing the action of the latter, seem to prove, that these diseases, are, in respect to a very principal point, essentially the same."[§]

Other experimentalists were, however, much more successful in confirming the opinion of Dr Jenner, as to the analogy or rather identity of the disease called grease in the horse, and the cow-pox in the cow. Mr Tanner is affirmed to have had the merit of proving this fact, he having succeeded in communicating the disease to the cow by inserting on the udder some liquid matter taken from the diseased heel of the horse. "From handling the cow's teat, "he observes, " I became infected myself, and had two pustules on my hand, which brought on inflammation, and made me unwell for several days. The matter from the cow and from my own hand proved efficacious in infecting both human subjects and cattle.[‖]"

Mr Lupton of Thame,[¶] and Dr John Loy,[**] ascertained the same fact. Dr Loy found by experiment that the matter of grease communicated to cows and also to the human subject a disease in no respect different from the true vaccine distemper, and, by afterwards inoculating with small-pox virus the persons who had gone through the equine pox, he had the satisfaction to find that they were equally protected against that disease, as if they had been regularly vaccinated with matter from the cow.

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[*] Report of a Series of Inoculations for the Variolæ Vaccinæ or Cow-pox. By William Woodville, M. D. 8vo. London, 1799.

[†] Ibid. p. 7.

[‡] Reflections, &c. and Experiments on the supposed Origin of Cow-pox. By W. Simmons, Surgeon. Manchester, 1798.

[§] Observations on the Cow-pox. By William Woodville, M. D. London, 1800, p. 28.

[‖] Life of Edward Jenner, M. D. By John Baron, M. D. 2 Vols. 8vo. London, 1838, Vol. i. p. 249.

[¶] Medical and Physical Journal for November 1800.

[**] Account of some Experiments on the origin of the Cow-pox. By John G. Loy, M. D. Whitby, 1801.

In the correspondence of Dr Jenner, published by Dr Baron, many similar facts are related, so that it may be regarded as having been fully ascertained that the matter of grease is capable of communicating a disease to man similar in all respects to that produced by the true vaccine matter, and giving full protection from the ravages of small-pox; and that the same matter, when applied to the system of the cow, produces in it the disease known by the name of cow-pox.

It has apparently been a much more difficult matter to prove the identity of small-pox with the cow-pox. Yet so early as 1802 it was announced in the journals of the day, that M. Viborg,[*] Professor of the Veterinary College at Copenhagen, succeeded in communicating small-pox to dogs, apes, and swine; and that it had been proved by experiment at the Royal Veterinary College of Berlin that the cow likewise had received the small-pox by inoculation. No details, however, were given to enable us to judge of the affinity of the two diseases, and we have as yet been unsuccessful in meeting with M. Viborg's original paper.

A very interesting series of experiments was performed by M. Godine,[†] Professor at the Veterinary College of Alfort in 1803, tracing the analogy of the small-pox, cow-pox, grease in the horse, and sheep-pox in the sheep. As these experiments do not appear to have been noticed by any of the writers on vaccination, with the exception of M. Bousquet, who merely alludes to them, it may be worth while to notice shortly their results.

M. Godine with the matter of grease inoculated the cow, the dog, and the sheep. The regular vaccine pustule appeared in the cow and sheep, attended with slight constitutional disturbance; and was from them transmitted to other sheep, where it produced the same disease. The matter inserted into the dog failed to have any effect, neither was that animal found susceptible of the cow-pox disease taken from man. These experiments were often repeated, and always with the same result.

Cow-pox matter was next made use of, in order to compare its effects with those above-mentioned, and was inserted into the system of the sheep by inoculation on the thigh. Perfect vesicles were formed, and matter taken from them produced the same effect in other sheep, and in no respect could any difference be detected between the vesicle produced by the matter of grease and that by the matter of cow-pox.

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[*] Medical and Physical Journal, September 1802, p. 271.

[†] Experiences sur la Vaccine dans les Betes à Laine. Par Godine, Jeune, Paris, 1803. Journal du Galvanism et de Vaccine, Vol. i. p. 29, also Vol. ii. p. 232.

Having thus, to his own satisfaction, proved the identity of these two viruses, his next object was to ascertain whether there was any identity between the contagious and fatal disease of sheep, called sheep-pox (claveau,) and small-pox. He, therefore, with virus from a small-pox patient, inoculated two sheep, when, in due time, an eruption appeared on these animals, in no respect different from the "claveau naturelle des moutons," attended with the same symptoms, and from the effects of which one died; and, on dissection, the same morbid appearances presented as are usually met with in that disease.

Matter taken from the variolated sheep, and introduced into the systems of those which had previously been vaccinated with the cow-pox matter from the cow or man, or with that of grease from the horse, produced no effect, the incisions healing rapidly, and no constitutional effect following. The same matter, however, when introduced into the system of sheep which had not undergone vaccination, produced sheep-pox in all its severity.

Sheep which had been previously vaccinated were also inoculated with the matter produced on those labouring under natural sheep-pox, but all escaped the disease; the poison had no effect. It was otherwise, however, with those which had not been vaccinated; they were all severely affected.

In conclusion, he remarks, that "it results from these experiments, that the small-pox of sheep, or the sheep-pox (claveau), as it is called, has the strongest analogy with the small-pox of man, since the variolous matter inoculated on the sheep produced that disease. That the opinion of Jenner as to the original source of cow-pox appears to be founded on fact, since the matter from the legs of the horse, called grease, has the same effect as the cow-pox. In fine, that the cow-pox preserves sheep from the sheep-pox, as it guards man from small-pox." *

M. Moutonnet,† as the result of his experiments, arrived at the same conclusions. He, however, met with a few cases of the sheep taking the natural sheep-pox after vaccination, but the disease was in them very mild.

Such were M. Godine's experiments; and it is to be regretted that he did not complete the link in the chain which was still wanting to prove the complete identity of small-pox and cow-pox, viz. the communication of the variolous matter to the system of the cow, and its conversion there into the mild cow-pox.

Little appears to have been done since that period for the elucidation of this interesting inquiry, till the outcry was raised that the present stock of vaccine lymph was degenerating, and the at-

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* Experiences sur la Vaccine dans les Betes à Laine. Par Godine, Jeune, Paris, 1803. Journal du Galvanism et de Vaccine, Vol. i. p. 47, 48.

† Ibid. Vol. ii. p. 244.

tention of the medical world was once more directed to the means of procuring a fresh supply from the cow. This proved to be by no means such an easy matter as might at first sight be imagined. Though cows are subject to various eruptive diseases, it was found that the vaccine disease was by no means of frequent occurrence, or perhaps it was not recognized. Since 1830, however, fresh supplies of vaccine lymph have been obtained from the cow in various quarters of the globe, from the natural disease; and Dr Sonderland of Barmen,* asserted in 1831, that he can produce the disease at will, by covering the cow with blankets from the bed of a deceased small-pox patient. The recent instances of the observation of the natural disease in the cow, are those of Professor Griva,† at Turin, in 1829; Mr Macpherson,‡ at Moorshedabad, in Bengal, in 1832; Bousquet,§ at Passy, in 1836; M. Girard,‖ at Rambouillet, in 1836; Brown,¶ at Sylhet in Bengal, in 1837; Mr Estlin,** in Gloucestershire, in 1838, &c.

Dr Sonderland appears to have found no difficulty in infecting the cow with the variolous contagion. He enveloped the animal in blankets taken from the bed of a patient who had died of small-pox, and also hung them up around the head of the animal that it might breathe the effluvia arising from them. In a few days, he says, the animal became sick, and pustules appeared on the udder and other parts, precisely similar to the cow-pox eruption, and filled like them with lymph. This lymph, transferred to the human subject, he found produced the genuine vaccine vesicles, together with the usual constitutional disturbance, and protected the person from small-pox virus or contagion.

In former numbers of this Journal, accounts were given of the vaccine disease as it was observed to occur in India, and at Passy in France. Suffice it to state, that Mr Macpherson was unable to succeed in repeating Dr Sonderland's experiment. He was unable to communicate small-pox to cows, either by inoculation, or by exposing them to the contagion of small-pox patients, or by wrapping them in blankets taken from the beds of small-pox cases. A fatal epizootic disease, however, which was known to the natives by the same name as that which they apply to small-pox, prevailed among the cattle around Moorshedabad. Mr Macpherson took matter from the pustules which appeared on the bodies of these animals, vaccinated with it the human subject, and thus produced the true vaccine vesicle and all the usual constitutional affection. He found no difficulty in keeping up the supply. The children who had been vaccinated with this matter were, as a counter-test, inoculated with variolous virus, but found to be secure from its operation.

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* Hufeland's Journal des Praktischen Heilkunde, Jan. 1831, and Edinburgh Medical and Surgical Journal. xxxvi. p. 446.

† Epidemia Vajuolosa del 1829 in Torino. Per T. D. Griva. Torino, 1831.

‡ Account of some Experiments relative to Vaccination. By G. G. Macpherson. Med. and Phys. Trans. of Calcutta for 1833, Vol. vi. p. 169. Also this Journal, Vol. xliv. p. 493.

§ Sur le Cow-pox decouvert à Passy. Par M. Bousquet. Memoires de l'Academie Royale de Medecine, Vol. v. p. 600. Paris, 1836. Also this Journal, Vol. xlvi. p. 244.

‖ Bulletin Royale de l'Academie Royale de Medecine for 1836, Vol. i. p. 99 and 264.

¶ Journal of the Calcutta Medical and Physical Society, April 1837.

** Account of a supply of fresh Vaccine Virus from the Cow. By J. B. Estlin, Esq. London Medical Gazette, 1838, p. 977.

At Passy, again, the matter was obtained from the hand of a woman who had received the disease from milking a cow which had a pustule on one of its teats. M. Bousquet thought the new virus more active than the old, as evinced by its causing a greater degree of inflammation around the pustules, and the duration of the vesicles being greater.

At Rambouillet the natural cow-pox broke out amongst the cows of the royal herd kept there, and M. Girard procured, from the sores on their udders, matter which produced the true vaccine vesicle in infants; and which was in every respect similar in effects to that procured by M. Bousquet at Passy.

Mr Brown obtained his supply of fresh vaccine matter from the cows at Sylhet, labouring under the same epizootic disease as that from which Mr Macpherson obtained his recent virus. The results obtained were very similar, generally speaking; but Mr Brown had the misfortune to see his vaccine disease ultimately and unexpectedly accompanied by a varioloid eruption, which assumed a fatal character.

Mr Estlin of Bristol obtained his fresh supply of virus from Gloucestershire. A child had been vaccinated by a needle with matter taken from the sore on the hand of a milker, and it was from this source that his supply was maintained. He also got some matter from the cow, as well as from the sore on the hand of a boy who was infected by the cow; but on vaccinating a number of children with these different parcels of lymph none succeeded excepting that which was taken from the arm of the girl who was vaccinated from the hand of the milker; and out of many who were vaccinated with this matter, only two were infected. In both of these cases the disease was late in coming on, and in one no redness appeared at the base of the vesicle till the tenth day, and the areola was not fully formed till the thirteenth, on which day a rash appeared, with much constitutional disorder. The vesicles from these two cases yielded an abundant supply of lymph, and he has been able to keep up the supply ever since. Mr Estlin regarded the lymph as of a very active character, and he observed that the constitutional symptoms were always tolerably severe.

We now come to the Essay of Mr Robert Ceely, who, by careful and judiciously conducted experiments, and much patient investigation, has adduced a large body of evidence tending to prove the identity of small-pox and cow-pox. It was the belief in the identity in the two diseases which led Jenner to introduce the vaccine or milder form, to guard the system from the attack of its severer form, small-pox. This belief, however, was rather a matter of conjecture than of demonstration; and hence we find many eminent men in the profession consider cow-pox as a disease altogether different in origin and nature from small-pox. This notion was with many a reason for the opposition which has been shown to the introduction of vaccination, and the belief in its anti-variolous powers. To instance one for all, we need only refer to the opinion of Mr Brown of Musselburgh, one of the opponents of vaccination, and we find that the proposition on which many of his arguments are founded is, that there are "particular diseases which the experience of the medical profession, and the general consent of mankind, concede in granting only to occur once in our lives."* Small-pox being one of these, he, and those who think with him, believe that it is only small-pox which can guard the constitution from subsequent attacks of the same complaint. As he and similar anti-vaccinists consider cow-pox a totally different disease, they see every fact through this medium, and convince themselves that "the number of valuable beings, exposed to the ravages of the small-pox, by reliance on the cow-pox, has increased to an alarming degree;" and that, unless small-pox inoculation be once more universally adopted, if ever that disease should rage epidemically, we shall witness all the horrors of the plague. To use the words of one of the earliest and most extravagant opponents of vaccination, "In many families there will be none to attend the sick. Nurses will quit their patients for their own safety; and servants fly from their masters' houses to shun the pestilence. Then we shall experience an horrid scene of public and private calamity; brought on by a medical experiment, embraced without due consideration; extended by a rash transgression over the bounds of reason; and after the fullest conviction of its inutility, obstinately continued, by the most degrading relapse of philosophy that ever disgraced the civilized world."†

Dr G. Gregory of the Small-pox Hospital, London, in his letter published in this number, p. 383, et seq., holds nearly the same opinion as Mr Brown. "Cow-pock," says he, "is a something that alters the human blood, and indisposes it to take small-pox;" and again, "you are quite right in believing that I consider cow-pox and small-pox two distinct affections;" and again, "vaccination is not small-pox, but just the reverse,—the antagonist principle."

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* Letter to the Right Honourable the Earl of Liverpool, concerning the present state of Vaccination, &c. By Thomas Brown, Surgeon, Musselburgh. Edinburgh, 1823, p. 23.

† A Treatise on the Lues Bovilla or Cow-Pox. By Benjamin Moseley, M. D., 2d edit. London, 1805. p. xxiii.

Freedom of discussion, as well as the interests of science, require that every one should be allowed to promulgate and defend those views, which he conscientiously believes to be well founded; and while, therefore, it is gratifying to observe gentlemen of the experience of Dr Gregory and Mr Stuart submitting the results of their observation to the profession, it is not less interesting to be informed of the facts ascertained by such inquirers as Mr Ceely. It is important to observe, that, however different observers may be at variance as to the fact of cow-pox being a modification of the same virus as small-pox, all now agree in the practical inference of the great protective powers which cow-pox exercises against the effects of the small-pox contagion. We are not sure, however, that it is a safe proposal, in such circumstances, to continue the practice of inoculation; as we are disposed, in the present state of facts, to think, that the more the pure variolous disease is multiplied and diffused, the greater are the chances of its attacks being severe, and producing all their usual bad effects, especially among the junior members of the community.

In the present essay, which holds a conspicuous place in the eighth volume of the Transactions of the Provincial Medical and Surgical Association, Mr Ceely studies to establish the two inferences,—*first*, that small-pox and cow-pox are identical diseases, though modified in some way; and *secondly*, that vaccination has been one of the greatest boons which Providence ever allowed man to present to his species.

Mr Ceely describes minutely the topography of the Vale of Aylesbury, which consists of a rich tract of land of about twenty miles in length, extending from Thame, in Oxfordshire, on the south-west, to Leighton, in Bedfordshire, on the north-east. It is bounded on the south by the Chiltern Hills, part of the chalk range which extends from Norfolk, in a south-westward direction, into Dorsetshire. On the west it is closed in by part of that oolitic range of hills which extends with uninterrupted continuity through Oxfordshire, Berkshire, and Wiltshire. The north and north-east sides are diversified by a cluster of gradually rising insulated hills, of nearly similar structure. The soils are chiefly rich clays and loams. The Thame, with its numerous tributary streams, abundantly waters the vale, which, in wet seasons, in many parts, is subject to extensive inundations.

Bronchocele is endemic, and is met with in all parts of the Vale, but more particularly on or near the hills. Struma is also of very frequent occurrence amongst the ill-lodged or badly fed poor. Fever of the intermittent, remittent, and continued types, dysenteric and acute gastro-intestinal affections are annually epidemic. The greater portion of the Vale is devoted to grazing and the dairy; and consequently an immense number of sheep, cows, and oxen, are kept on the extensive and rich pastures.

In common with many other parts of the kingdom this neighbourhood suffered much from the contagious epizootic which prevailed so fatally amongst horned-cattle from the years 1745 to 1780; the places of interment of many of its victims are still pointed out; and the dismal tales of its ravages are still remembered. The disease which has last year been so prevalent on the continent, the *aphtha epizootica*, likewise made its appearance in the Vale, but not to any very great extent.

Mr Ceely enumerates many of the diseases to which the cows are subject, such as inflammation and induration of the cutaneous follicles at the base of the teats; small hard knots in the same situation, which burst after attaining the size of a walnut, and frequently affect the hands of the milkers, as also the teats of the other cows milked by the same hands; the yellow pock, the bluish or black pock, the white pock, &c. The last of these he mentions as being a highly contagious disease, both to the milk cows and to the milkers, quickly causing vesications and deep ulcerations; often or always confounded with the true vaccine pock, and certainly not readily distinguishable in all its stages, even by better informed persons than the milkers.

The author next proceeds to the consideration of the *variolæ vaccinæ* as they appear, 1*st*, naturally, or are produced casually on the teats and udders of the cows by the manipulations of the milkers; 2*dly*, by vaccination; 3*dly*, by retro-vaccination; 4*thly*, by variolation.

The *variolæ vaccinæ* are mentioned as having been long known in the Vale and neighbourhood; having been noticed at irregular intervals, but most commonly appearing about the beginning or end of spring, very rarely during the heats of summer. Cold and moisture are supposed to favour their appearance, but the evidence on this point is somewhat contradictory. The disease is occasionally epizootic, but more commonly sporadic. Sometimes it may be seen at several contiguous farms, at other times, farms, apparently similarly situated as to soil and situation, escape the visitation. It is frequently introduced into the dairy by recently purchased cows. It is considered as a disease peculiar to the milk cow; and that it occurs frequently as a primary disease among milk heifers, being casually propagated to others by the hands of the milkers. Mr Ceely has, however, not been able to verify this remark from his own observation.

Several intelligent dairymen have ascribed the origin of the disease to the contagion of the equine vesicle; but, as very little of this disease has been seen of late in that neighbourhood, Mr Ceely has not had an opportunity of noticing the fact, though he mentions that he has known "several farriers who have been affected from the horse, and resisted subsequent variolation or vaccination." "For many years past, however," he says, "the spontaneous origin of the *variolæ vaccinæ* in the cows has not been doubted here. In all the cases that I have noticed, I never could discover the probability of any other source."

Mr Ceely is inclined to believe that the disease primarily appears in one individual only, spreading to the others by means of the hands of the milkers. In the great majority of instances he could not learn that food was refused, or that any febrile symptoms were present. Heat and some induration of the udder and teats were usually the first apparent symptoms. It was observed that the secretion of milk was somewhat diminished during the continuance of the complaint, and from the teats being sore, temporary trouble was occasioned, and accidents to the milk and milkers; but the animals in general continued to feed and graze as well as before.

When the udder was short, compact, and hairy, and the skin of the teats thick, smooth, and tense, the animal often escaped with a very mild affection, sometimes only a single vesicle; but when the udder was loose and flabby, and the teats long, corrugated, and fissured, the animal had generally a severe attack and a copious eruption.

The *variolæ vaccinae* once originating, or being introduced, if the necessary precautions were not adopted in time, soon spread to all the other cows in the same shed, so that by the third week, nearly the whole were affected. In general all in the same shed, milked by the same hands, took the disease; but the author has seen instances where both old cows and also young milk heifers have escaped, though exposed to all the circumstances favouring contagion.

For the topical symptoms of the disease in its early stage when it occurred naturally, Mr Ceely was compelled to depend on the information of the milkers. They stated that, for three or four days without obvious indisposition, the teats and udder became hot and painful, shortly after which pimples appeared, especially on the base of the teats; on light skins these were noticed to be of a red colour about the size of a pea and hard, but in three or four days, having acquired the size of a bean, milking became painful to the animal, and, as they rapidly increased in size and tenderness, they were at length broken by the hands, and milking became a dangerous and troublesome process. After this stage Mr Ceely has seen them, and remarks that they must evidently have had a central depression and marginal induration. Those still entire, when punctured, allowed to escape a viscid, amber-coloured fluid. Crusts of a brown or black colour, solid and uniform, formed over these vesicles, and if detached, left exposed a raw surface with a slight central slough.

The topical symptoms of the casual *variolae vaccinae*, or that produced from the hands of the milkers conveying the matter from the diseased to the healthy, have been carefully noticed by Mr

Ceely. Rarely has he remarked any symptoms of affection of the parts before the sixth or eighth day after undoubted exposure to the contagion. On the sixth and seventh days, in cows with white clear skins, on the lower parts of the udder, were observed circumscribed indurations, as large as a vetch or pea, and of a reddish colour; a few were still larger, six lines or more in diameter, and had a central depression, very perceptible to the finger, in which was visible a small, dirty, yellowish-white discoloration, surrounding a still darker dot or line. These indurations were often interspersed with minute red papulæ of a darker colour. The same tumours were noticed on the teats, varying in number and size. Both those on the udder and teats had a pearly or glistening lustre on their margins and part of their centre. On the eighth and ninth days, some of the tumours appeared more depressed in their centres, and more elevated at their margins, which were solid, uniform, tense, and shining, and of a glistening white, pearly, or silvery hue; around the base was often apparent a narrow pale-rose or light-damask coloured areola, not more than a line or two in width. In some there was a central crust of a yellow, brown, or black colour; and a few appeared pustular. The same appearances were presented by those on the teats, but they were usually abraded by rough handling. Between the tenth and eleventh days, the disease generally reached its acme. On the udders, the tumours were frequently from eight to ten lines in diameter, and the centres and central edges of the intumescent margins were of a deeper blue or slate colour, and the areola of a pale-rose colour, extending for four or five lines around them; the skin was indurated beneath the areola. Lymph was now easily obtained from beneath the cuticle of the central depression; it was often so abundant as to raise the cuticle into a globular or conoidal vesicle. In some of these tumours, the central black crusts had greatly extended towards the margin, and others were entirely encrusted. Similar changes occurred on those tumours which were still unbroken on the teats; but generally, the interfluent vesicles were covered with brown or black irregular rough crusts, or, denuded of cuticle, were raw, with swollen and elevated margins, and were discharging blood, lymph, and purulent matter. On the udder, on and after the twelfth day, nearly all was passive; the central crusts rapidly increased, and the marginal intumescence proportionally subsided. The crusts rarely acquired increased breadth after the thirteenth day. The marginal indurations gradually subsided, and had nearly disappeared on the spontaneous separation of the crusts, which took place on the twentieth or twenty-third day; but some induration was perceptible for some time longer surrounding the cicatrix, which was shallow, round, or oval, of a pale-rose or whitish colour. On the teats similar changes were observed in the unbroken vesicles and tumours, but in general very different appearances were observed. Large black crusts, often more than an inch in breadth, were adhering, more or less loosely, to the raw bleeding surface, which secreted a discharge similar in odour to that emanating from a person in an advanced stage of small-pox.

The normal course, then, of the vaccine disease was found to be completed in from twenty to twenty-three days, viz. four days from the probable invasion of the disease, to the appearance of the eruption; six or seven from this period to the full developement and perfect maturation of the vesicle; five or six from its decline to its perfect desiccation; and five or six from this period to the separation of the crust, and the formation of the cicatrix. Irregularities, however, occurred in these different stages, which it seemed difficult to account for.

Mr Ceely has examined the anatomical structure of the vesicle, and found that "its colour, indurated margin, and central depression, depend on the existence of an adventitious membrane, formed in the corium and secreted by the papillæ. It is raised in the form of a zone, and is intimately connected with the epidermis. It has a cellular structure, in which is secreted and contained a clear viscid lymph. The cells appear to be arranged in two concentric rows, and are separated from each other by whitish radiating partitions, which, at their converging extremities, are united by a central membranous band. The dusky central spot which marked the first change of the pimple into the vesicle, and which has now become darker and more distinct, seems to be caused by a greater or less degree of separation and desiccation of the epidermis, stretched over a crypt-like recess, which contains a small quantity of semi-concrete lymph-like matter, occasionally a turbid opaque fluid. This cellular, adventitious, membranous conformation, though differing in texture and amount in different vesicles, is invariably present, and is not less essential than diagnostic. About the fourth or fifth day of the eruption, or two days before the decline of the vesicle, there often appears at its base a red circle, which gradually increases in extent till that event occurs. During this period, the lymph within the cells having become more abundant and less viscid, and somewhat opaque, bursts and breaks up the cells and their connecting band, separates the epidermis from its attachment to the subjacent adventitious membrane, and the vesicle, losing its central depression, becomes more or less acuminate, presenting a conoidal or semiglobular form."—P. 317.

Mr Ceely then enumerates shortly the normal form and appearance of the *variolæ vaccinæ*, in order to compare it with the apparent anomalies and irregularities which are occasionally observed. He remarks, that the eruption commenced in papulæ which had their seat in the corium, but were not always simultaneously developed. They acquired their vesicular character in three or four days from their appearance, and exhibited their central depression. In three or four days more they had arrived at their fullest developement, and were surrounded with an areola, and imbedded in a circumscribed induration of the surrounding skin and cellular tissue. The vesicles varied in size from a pin's point to that of a sixpence. Often in the same subject the eruption was seen in all its varied stages, from papulæ, to the partially desiccated vesicle. This he accounts for on the supposition that revaccination had taken place either from pressure on the recumbent posture breaking some of the vesicles, or, as most usually was likely to happen, from the reiterated manipulations of the milkers. Some papulæ appearing late never passed into other stages; others of earlier date possessed some of the vesicular attributes; others still earlier exhibited them all, and hastened on with rapid but unequal steps to the final stage of desiccation. Such being the case, the author arrives at the conclusion, that "the disease in the cow has few if any anomalies by which it may be distinguished from the disease observed in man. The phenomena in man called supernumerary vesicles, and those produced by what has been called Bryce's test, seem as strictly analogous to those appertaining to the cow as can well be desired."—P. 325.

The cow, like children, is described as being subject to a purely vesicular eruption, consequent upon vaccine fever, which often bears a striking resemblance to vesicular varicella. This usually occurs about the ninth or tenth day of the vaccine, in the form of erythemato-papular elevations of different sizes, solitary or in groups, evidently of sub-epidermic origin, which within twenty-four hours contains a pellucid serous fluid, which raises the epidermis. On the second day the fluid is straw-coloured and turbid; and before the fifth the vesicles are desiccated with brown and black thin, brittle crusts, which speedily fell. They often continued to form and desiccate for three or four weeks. Several eruptions were noticed as occurring at this period; but none of them so liable to be mistaken for the vaccine as the white pock.

The occurrence of the casual cow-pox in man forms the next subject of the author's inquiry. The difficulty of forming any accurate estimate of its absolute or relative frequency is remarked, as the milkers apply this name to every disease which occurs in a severe form, and is communicated by contagion. For the period of nineteen years, during which Mr Ceely has been attending to these eruptions in the cow, he has observed that cow-pox is more rare than the other eruptive diseases to which the animal is subject, but that still it is of frequent occurrence in the central and northern parts of the Vale.

The casual cow-pox was most generally met with in those who had not previously gone through variola or the vaccine disease; but it was also noticed on those who had these diseases; and cases every now and then occurred where those who had caught the affection from the cow were, after the lapse of a few years, again infected. Mr Ceely also mentions that he has several times succeeded, with ordinary humanized lymph, in producing modified vesicles, with smart constitutional symptoms, on persons who, from seven to thirty years before, had had the casual cow-pox severely. As in the cow, so in man, it did not appear necessary that the skin should be visibly fissured or abraded to insure infection. The parts commonly affected were the back of the hands, particularly between the thumb and forefinger, about the flexures of the joints, and on the palmar, dorsal, and lateral parts of the fingers. The forehead, eyebrows, nose, lips, ears, and beard were often implicated, from incautious rubbing with the hands during or after milking. The papulæ or inflamed spots, which announced the disease, were circumscribed, well-defined, hard, deep-seated, and acuminated; and varied in colour from a deep rose to a damask or purple hue. When these papulæ were small they often exhibited no central depression during their change into the vesicular state, but their apices were acuminated, and of an ash or bluish colour; as their bases enlarged, however, they became relatively flattened, and assumed a yellowish tinge. As the areola was developed, these small vesicles became more or less elevated in their centres, but still retained their yellowish tinge. The larger vesicles had a well-marked central depression in their early stage, and frequently a livid or ecchymosed appearance, similar to what was frequently noticed in the cow. When fully developed they had a bluish or slate-coloured hue, which increased in depth, and was more conspicuous on their decline. The vesicles varied in size from a vetch to that of a fourpenny piece. If broken accidentally, or burst spontaneously, they caused deep sloughing, and ulceration, difficult to heal, and attended with much local irritation and symptomatic fever.

In some individuals, long before many vesicles were apparent, and three or four days before the appearance of the areola, constitutional symptoms were well-marked; in others the constitutional affection was not induced till the areola was well-developed. Where the vesicles were imperfectly developed, and there was little or no constitutional disturbance, the individual could not be regarded as secured from the variolous poison; and Mr Ceely says he has met with cases of distinct yet mild small-pox in such persons. Mr Ceely considers these characters as sufficient to distinguish the vaccine vesicle from any of the other eruptions which appear on the hands of the milkers. Papular, vesicular, or bullous eruptions were occasionally seen attendant on casual cow-pox, especially in young persons of sanguine temperament, and florid complexion, at the height or after the decline of the disease.

Primary lymph, in a state fit for use, was by no means easily obtained; and often before Mr Ceely was informed of the existence of the disease in a large dairy, it was too late even to obtain primary crusts. The best lymph was obtained from perfect vesicles before the period of their acumination; but was not to be depended upon after that period. Broken vesicles could not be relied on, on account of their liability to afford more than the specific secretion. Entire unacuminated vesicles should be sought for where they are least exposed to injury, viz. on the lower and naked parts of the udder, near the base of the teats; but the greatest care and circumspection was necessary, as there was some difficulty in obtaining lymph in sufficient quantity from these sources. The puncture should be made as near the centre of the vesicle as possible, and slight pressure of the vesicle between the thumb and fingers, or with the blade of the lancet, will, after some time, enable the operator to charge a few points with the slowly exuding lymph. The puncture at the margin of the vesicle yielded only blood, besides irritating the animal. Vesicles with central crusts must be treated the same way.

When these sources failed, useful substitutes for liquid lymph were still to be obtained from amorphous masses of concrete lymph, central irregular crusts, or desiccated vesicles.

Mr Ceely's introductory remarks on the vaccination of man with primary lymph are as follows:

"The rarity of the natural cow-pox, the difficulty of obtaining information of its existence, even in the very neighbourhood where it arises, the mischief so often done to the vesicles by the milkers, and the advanced stage of the disease before inspection, preclude the frequent practice of vaccination with primary lymph, if it were necessary or desirable. But there are also formidable obstacles to the success of the process, even when primary lymph is obtained in all its purity. These impediments to successful vaccination seem to arise from two causes: first, the natural difficulty with which animals of one class receive a morbid poison generated in animals of another class; and secondly, deficiency or imperfection in the mode of communication. Although it is admitted that man more readily receives some of the morbid poisons of the lower animals than they receive his, yet it would appear that even in him there are various degrees of susceptibility, and that some individuals seem altogether insusceptible under ordinary circumstances. This certainly may be asserted with respect to primary and imperfectly assimilated vaccine lymph, at least by the usual mode of transmission. The following facts, which have often fallen under my own observation, and which have been repeatedly witnessed by many of my medical acquaintance, seem to me to justify these conclusions.

"1. More than half my attempts to vaccinate with primary lymph, taken from vesicles at a proper stage, and possessing all the characteristics of perfection, have entirely failed. The same individuals have immediately afterwards been successfully vaccinated with dry or liquid lymph which had been long current in man.

"2. A small number, vaccinated from the same primary sources, afforded results in various degrees of imperfection. In general, the seventh or eighth day has elapsed before any indications of infection have appeared: a dark red pimple has slowly advanced, and gradually assumed a tubercular or tuberculo-vesicular form, being either perfectly lymphless, or a dark red tubercle on the thirteenth or fourteenth day with a scanty supply of lymph on its acuminated summit, with a moderate areola, slowly subsiding, attended by very trifling or scarcely appreciable constitutional symptoms. Nearly all these subjects have been successfully re-vaccinated with ordinary lymph, from periods of nine to eleven months, in different degrees of modification, but always with a nearer approach to perfection.

"3. A still smaller number, vaccinated from the same primary stocks, have furnished vesicles in the highest degree of beauty and perfection. But even in many of these there has been more or less delay in the full developement of the vesicles; and in nearly all, the number of the vesicles has seldom equalled one-half of the punctures.

"4. Precisely similar phenomena of entire failure, imperfect, or complete vaccination, with all their attendant circumstances, have followed the use of lymph from perfect casual vesicles on the hands of the milkers; and the like results have frequently attended the early removes of lymph from the most perfect primary vaccinations.

"5. The whole of these phenomena—abortive punctures, tubercles, tubercular vesicles, imperfectly developed, and perfectly normal vesicles—may be frequently seen co-existent on the same individuals, either from primary lymph, casual lymph, or the early removes of both from any given vesicle.

"6. Although, with the few exceptions previously stated, the copious, repeated, and long-continued casual application of cow-pock lymph to a highly sensitive, vascular, mobile, and extended surface, with or without abrasions, chaps, or fissures of the cuticle during the process of milking, proves a more perfect and successful mode of communicating the disease, yet it is abundantly obvious that even this superior mode is in general more prompt and certain in infecting the cow than the milker."—Pp. 342–345.

Whether the vaccination with lymph from the cow was successful or not, Mr Ceely always remarked on the next day, a remarkable and unusual degree of redness around the punctures, which gradually declined on the third or fourth day; and where vaccination failed, soon disappeared. When successful, however, and the vesicle was normal or nearly so, the redness became concentrated, and at length blended with the red elevation of the vaccine vesicle. Frequently a considerable interval elapsed between the decline of the blush and the commencement of the first stage of the disease, the appearance of the papulæ being delayed to from the sixth to the tenth day. Hence there was much irregularity in the period of the full developement of the vesicles, and the areola was often not completed till from the eleventh to the sixteenth day. This was the period when small supernumerary vaccine vesicles appeared on various parts of the body; and papular, vesicular, and bullous eruptions were frequently noticed. The induration of the integuments surrounding the vaccine vesicle was in general greater than when the disease was produced from ordinary humanized lymph; and the areola was observed to decline and revive in a very peculiar manner.

The process of desiccation was usually retarded; and fluid was frequently found in the vesicle till the sixteenth or eighteenth day. The crust was often retained till the end of the fourth or fifth week, and brought away with it a circle of the corium, often the whole depth of it, and a portion of the subjacent cellular tissue, leaving a deep foveolated red cicatrix, or a yellow foul excavation, which ultimately furnished a pink, shining, puckered cicatrix, resembling a small-pox scar. In strumous habits troublesome ulceration often resulted, causing abscesses in the cellular membrane and axillary glands.

The character of the vesicle was found to vary considerably, according to the temperament, habit of body, quality, and condition of the skin, and also from special qualities in the lymph itself. The vesicles often exhibited a bluish, ecchymosed, or livid appearance, not only at their commencement, but also at their decline. They were often remarkably well developed, as much so as those produced by ordinary lymph; very often, however, they were less fine and less developed than ordinary vaccine vesicles, but were found to admit of a remarkable improvement by being transmitted three or four times through well selected human subjects. By this process, too, most of the defects, and some of the evils connected with the use of primary lymph were found to be dissipated, and the lymph rendered milder and better suited to general purposes.

Mr Ceely remarks that there was danger of loosing the stock of new lymph, if a large number of suitable subjects were not at hand. He prefers children, as the best for the purpose, possessing a thick, smooth, clear skin, with a dark, and not too florid complexion. The vesicles in infants of this description were always better formed, were less liable to burst or be broken, had less areola, and furnished better lymph with less risk than in infants of different physical appearances. When transmitted successively through three or four such subjects, the vesicles acquired a magnitude and beauty often greatly superior to what is daily witnessed, and the lymph could be transferred with perfect safety to others more delicate.

When the lymph was thoroughly assimilated to the human constitution, he thinks three or four punctures were generally amply sufficient, though for some subjects a less number would be safer. He cautions particularly against rupturing the vesicles, as they were apt to produce the same deep ulcerations and abscesses of the cellular tissue and axillary glands as the primary lymph.

In the successive removes from the primary lymph, he has remarked the greatest possible diversity in the appearance of the vesicle. Some were meagre or ordinary, others were bold and elevated with rounded margins, and turgid with lymph; others had narrow acute margins and broad centres, equally well stored with lymph; others again were thick and fleshy, or flat and level with the skin, and scarcely afforded any lymph on the eighth day, without any abatement, however, of their needful activity; while every now and then cases occurred exhibiting all the inconveniences and characters of vesicles produced by primary lymph.

The constitutional symptoms were usually more severe in the disease caused by primary vaccine lymph and its early removes than in that from ordinary lymph. In many instances the symptoms appear as early as the fifth day, more commonly on the sixth and seventh, with morning remissions and evening exacerbations, terminating on the ninth, or augmenting till the areola arrived at its height. In other instances, they were not manifested till the eighth or ninth day, sometimes even later; and occasionally they were scarcely observable.

As Mr Ceely never heard of the occurrence of cow-pox in any other than milk cows in his neighbourhood, he became anxious to ascertain whether sturks or young heifers were susceptible of the disease and its attendant phenomena, when artificially induced by primary lymph. He vaccinated, therefore, some of these animals, about ten months old, in the inside of the ear, on the teats, and in the soft and vascular structure on and near the vulva, with lymph taken from milk cows, in the winter of 1838–39, while the disease was prevalent in many of the dairies. Punctures were made in the ordinary way with lancets well charged, and with points thoroughly imbued with good lymph; two or three of the latter were broken off, and allowed to remain in each wound. He found less difficulty in succeeding than he had supposed, or than was experienced in vaccinating cows, with lymph taken from man. The punctures early inflamed, generally the second day; the papular stage was not well marked, and the vesicles, which were normal, declined on the eleventh day.

" On the teats there was much tumefaction of the integuments until the thirteenth day. On the parts near the vulva, the vesicles, though declining on the eleventh, occasionally revived and declined for two or three days, as they often do in the natural and casual forms. When the crusts fell spontaneously at the proper time, a moderately deep smooth scar was observed; but if prematurely removed, a deep erosion of the skin ensued. On the inside of the ear the vesicles appeared less developed, though the lymph was reproductive. No indisposition in the animals was noticed beyond a slight acceleration of the pulse. The lymph used in the above experiments was from the same source, and of the same date, as some which had been applied to children and adults." "The lymph resulting from these vaccinations of the cow, taken on the tenth day, and transferred to man, differed in no respect from that which has been described, except that the inflammation and induration at the base of the vesicles were certainly less considerable, and the subsequent scars rather less deep, but remarkably well defined, and even now appear to have extended through two-thirds of the substance of the corium."—P. 353–54.

Mr Ceely's next experiments were on vaccination of the cow with humanized lymph, or consisted in what he terms retro-vaccination. The animals selected for these experiments were sturks under twelve months old, as cows were difficult to be had for that purpose. The parts selected for the operation were those in close proximity to the vulva, as most easy of access and most suitable in every respect. The lymph used was either dry, or liquid in capillary tubes; and no precautions were taken further than excluding the animals from cold and moisture immediately after the operation for a few hours, or occasionally for a night. Scarcely one-half of the operations succeeded. In the majority of instances, where the vaccination succeeded, the vesicles ran their normal course, and declined on the eleventh day. Four different kinds of lymph were used, each having been current in man for a longer or shorter period. Four of these experiments are given in detail, in order the better to illustrate the particular attendant phenomena; and as one will setve as an example, we give it in the author's words.

"*Retro-vaccination with lymph which had been several years in use.*—It appeared sufficiently active, and from arm to arm was attended with satisfactory results. *Subject*: a small ill-conditioned sturk, strawberry coloured, thin skin. Seven punctures were made near the vulva, and eight points inserted recently charged with fifth-day lymph from a fine child on the 1st of February 1839.

"Second day: Nothing remarkable.

"Fourth day: Some of the lower punctures rather red.

"Fifth day: Scarcely any traces of punctures left.

"Sixth day: Punctures appear perfectly passive.

"Seventh day: Two punctures rather elevated and inflamed.

"Ninth day: All the punctures raised in the normal form, but in different degrees, the vaccine tumours being of different sizes; tried to procure lymph, but failed, both on the surface of the tumid margins, which yielded only blood, and in the centres, where there is a slight crust.

"Tenth day: There are four fine large and three small vesicles, from two of which were charged one hundred points, abundantly, with clear adhesive lymph, some of which was used on the same and subsequent days. The punctures made yesterday had given rise to the exudation of lymph which is now visible in the form of light amber-coloured concretions on the parts.

"Eleventh day: The vesicles appear diminishing, and amber-coloured lymphatic concretions are formed in their centres. *Vespere*: Crusts enlarging; vesicles subsiding.

"Twelfth day: Upper vesicles have a pustular appearance in places; others have a yellowish brown crust; others flattening.

"Thirteenth day: All subsiding; crusts larger.

"Fourteenth day: Subsiding.

"Fifteenth day: Crusts more elevated; margins flatter.

"Sixteenth day: Declining.

"Seventeenth day: Intumescent ring nearly disappeared; black crusts alone remaining.

"Eighteenth day: Every thing diminishing.

"Nineteenth day: Small elevations in the site of the vesicles, still lighter than the ground.

"Twentieth and twenty-second days: Some crusts prematurely removed by accident; others spontaneously fell on the twenty-second and twenty-third days, leaving small pale rose-coloured smooth scars slightly depressed in the centre.

"February 26th: Inoculated with liquid small-pox lymph (variola discreta, seventh day,) in five punctures, from capillary tubes, on right side of labium pudendi, the wounds being at the same time deluged with fluid.

"Third day: Slight tumidity around the punctures.

"Fourth day: A shining glassy tumidity around the punctures, which are larger.

"Fifth day: In *statu quo.*

"Seventh day: All subsiding; no result.

"March 12th: Re-inoculated with dry sixth-day confluent small-pox lymph, inside and outside the left labium pudendi, with several points; four punctures. Re-vaccinated with seventh-day 'variola vaccine' lymph, two removes, inside and outside of the right labium pudendi; several points; four punctures. No result from either."—Pp. 355–357.

In one of his experiments, no apparent effect was produced on the fourth day, but on opening the punctures, and re-vaccinating with the same matter, vesicles suddenly became developed, without having passed through a palpable and progressive state of papulation, and attained their full developement by the tenth day. Analogous occurrences, he remarks, from various causes, take place in man, especially in using primary retro-vaccine and unassimilated lymph; and similar phenomena are noticed in the natural and casual disease in the cow.

The retro-vaccine lymph from these experiments, when taken on points thoroughly and trebly charged, and immediately used, produced perfect vesicles in man. The papular stage, however, was late, being not till the sixth or seventh day. This matter was vaccinated on subjects of different ages, and excepting in respect of the lateness of the papular stage, and in the vesicles themselves being somewhat smaller, did not appear to differ from the matter which had not undergone the transit through the system of the cow; no difference being noticed in local or constitutional symptoms. Even the slight change which it had undergone in its transit through the system of the cow was not apparent after the third remove.

Mr Ceely concludes from these experiments, that it is more difficult to vaccinate the cow with humanized than with primary lymph, and that, when vaccination is successful, the disease is milder; that vaccine lymph, therefore, in passing from the cow to man, undergoes a change which renders it less acceptable and less energetic on being returned to the animals of the class which produced it; some, indeed, being incapable altogether of being affected by it. He also remarks that this difficulty of infecting the cow with humanized lymph is not, however, so great as that experienced in passing primary lymph from the cow to man. His experiments also demonstrate that the age of the humanized lymph did not appear to influence its reception in the system of the cow; for provided the lymph was of ordinary activity, and possessed its normal qualities, it succeeded equally well in its operation, whether it had been current in man for only a few weeks, or for many years; exciting in both cases equally perfect and productive vesicles.

As to the question whether the practice of retro-vaccination is of any real value, as a means of renovating humanized vaccine lymph, Mr Ceely says, "I confess, that from my limited experience, (these few observations and experiments), I am unable to discover its advantages, or to admit more than its questionable utility, from one transit through the cow. What húmanized vaccine might acquire by repeated and indefinite transmissions, I am not prepared to say."

He then considers shortly the question, whether vaccine lymph, in passing through many individuals, with all due care and selection, is susceptible, in process of time, of actual degeneration or essential diminution of intensity? It appears to be generally believed, that, in India, the vaccine virus speedily degenerates. In an interesting paper on the regeneration of the vaccine virus at Sylhet in India, Mr Brown states,* that, in the course of three or four months, the lymph gradually changes to a thin purulent-looking fluid, of a dirty-white colour at first, and afterwards more resembling thin purulent matter of an unhealthy character. He also mentions, that those vaccinated with this lymph are found to be more liable to be attacked with small-pox than those who have been vaccinated in Europe. Dr Gregory† inferred, that the vaccine lymph, which had been long used at the hospital, was of diminished intensity, from the circumstance of eight or ten punctures producing not more irritation than what three or four used to do fifteen years before; and the same opinion is entertained by many at the present day. M. Bousquet, in his work on vaccination,* published in 1833, at the request of government, after the most impartial investigation of the question, and a comparison of both the Jennerian descriptions and figures, with what is observed at the present day, arrived at the conclusion, that, "whether we look at facts, or collect opinions, everything concurs to prove that the vaccine lymph has not undergone deterioration, and that vaccination has lost none of its value;"† and he informs us, besides, that this conclusion is abundantly borne out by the correspondence of the Academy of Medicine, and by all those who have paid especial attention to vaccination, since its introduction into France, as MM. Barrey of Besançon, Nedey of Vesoul, Labesque of Agen, Depuy of Bordeaux, Valentin and Serrières of Nancy, &c. In his account, however, of the discovery of cow-pox at Passy, published in the Memoirs of the Academy, he is disposed to believe in the possible superiority of the new vaccine lymph over that which has been long in use. Dr Griva of Turin, comparing his own experiments on primary with the ordinary humanized lymph, and the analogous observations of many distinguished persons who had favoured him with a detail of theirs, asserts that he could detect no superiority in the one lymph over the other. The report of the National Vaccine Establishment ‡ maintains, or rather presumes the same doctrine; for it is there stated that lymph obtained thirty-eight years ago from Dr Jenner still manifests all its peculiar influences. Mr Ceely, whose opinion is highly valuable on this point, as he has had such frequent opportunities of comparing the primary with the old lymph, coincides in opinion with those who hold that the vaccine virus has not degenerated, and states, that his "own repeated applications to the cow have been chiefly for the purpose of experiment, for the satisfaction of patients, or the accommodation of friends, not from any belief in its superior protective efficacy over active humanized lymph."—P. 376.

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* Quarterly Journal of the Calcutta Medical and Physical Society, April 1837.

† Report on Small-Pox, &c. London Medical Gazette, February 1838.

Mr Ceely endeavours to account for the discrepancy in the opinions of these two parties by showing that those who maintain the vaccine degeneration look more to the secondary effects of the disease, than to its primary action on the system. The primary constitutional affection was, by Jenner himself, shown to be that which guarded the system from the small-pox, whilst the secondary and more severe was noticed to be dependent on the local irritation, ulceration, &c. which in the first removes of the virus from the cow was often great; but which Jenner, and more lately Bousquet have shown may be totally prevented, without affecting the antivariolous powers of vaccination.

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* Traité de la Vaccine et des Eruptions Varioleuses ou Varioliformes. Par M. J. B. Bousquet. Paris, 1833.

† Op. cit. p. 235.

‡ London Medical Gazette, May 19, 1838.

Having devoted some attention to this subject, it may be stated that we perfectly coincide with Mr Ceely in his views. Again and again have the vesicles and primary constitutional symptoms been compared with the original descriptions and figures of Jenner, Woodville, &c. and no symptoms of degeneration could be observed. We have often met with vesicles from which active matter has been extracted the tenth and even the twelfth day after vaccination, and where the crusts have not fallen off till the end of the fourth or beginning of the fifth week. It was invariably remarked, that the severe constitutional symptoms were dependent on the irritation of the local sore, and that remedies applied to the sore removed those symptoms, which it could not have done had they depended on the activity of the vaccine virus.

Mr Ceely's next experiments were conducted with the view of ascertaining whether small-pox and cow-pox had a common origin, and whether the one differed from the other merely from its being modified by having passed through the system of the cow. He states that he was much struck with the account of Dr Sonderland's experiments, but more particularly with his seventh aphorism, which is to the effect that the reason why cow-pox is so seldom observed in the cow now-a-days is, that small-pox has been so rare during the last thirty years, that cows could seldom be exposed to the infection. Mr Ceely was induced to make careful inquiry through the vale of Aylesbury, to ascertain how far Dr Sonderland's opinion could be substantiated by what occurred there for a similar period, and, as the result of his inquiries, he collected the following facts:—

"The cow-pox has occurred: *First,* During epidemic small-pox, but when no cases of variola have been known in the neighbourhood: *Secondly,* When variola has been prevalent in neighbouring towns: *Thirdly,* When variola has been in contiguous villages: *Fourthly,* When in the same village (perhaps a solitary case) in which the affected farm was situate: but *Fifthly,* I have never succeeded in tracing positive or probable intercourse of convalescents from small-pox, their friends or attendants, with a dairy or its occupants, except in one instance in the autumn of 1838, during which time, and the early part of the following year, cow-pox was prevalent, and in this case it can scarcely be supposed to have had any influence; the milker had carried a child some miles labouring under modified small-pox; and *lastly,* that it is often seen in a single farm, but not unfrequently in several at the same period."—Pp. 378–79.

As nothing, therefore, but direct experiment seemed capable of determining the point at issue, Mr Ceely set about making experiments first after the manner recommended by Dr Sonderland. Two milk cows and one heifer were invested with the blankets and sheets from the bed of a deceased small-pox patient, and in which also another patient had lain till the twelfth day of the eruption. The cows were shut up for three days and nights, and then for three days more, but were let out at night. The heifer was kept under an open shed during a week. These all perspired freely under their coverings, but no indisposition, and no eruption followed. In a fortnight all these animals were inoculated with small-pox matter of the fifth and ninth days, by the lancet, and by the seton, in the ear, udder, and teat, but without any apparent result. On examining the setons which had been inserted into the udder three months afterwards, they were found firmly adherent to the parts into which they were inserted, and as passive as if they had been passed through leather.

These same animals were subsequently vaccinated with points, seton, and the lancet, on the teats, udder, and back, with recently taken eight-day lymph, but no result was obtained. One of them was again invested with blankets from a small-pox patient's bed, but gave no result.

Not discouraged with these negative results, he resolved to persevere, and accordingly inoculated several young heifers with variolous matters, and, as the results are of the highest interest, we quote the details of one of the series of experiments :—

" February 1st, 1839: Inoculated three sturks with small-pox virus, (variola discreta,) seventh or eighth day, on large points—the teeth of a comb—charged twelve hours previously. Sturks about ten months old.

" *Experiment, first,*—Red and white sturk, thin skin, gentle, well bred :—Made seven punctures, and introduced fourteen points, charged half their length, near the left side of the vulva, and below it. Inserted two setons, charged with small-pox virus from the same subject, at the same time.

" Fifth day : Two or three of the punctures tumid, all closed with brown plugs ; setons tumid.

" Sixth day : Some punctures tumid.

" Seventh day : Less tumid.

" Eighth day : Still less so ; setons passive, dry, adherent.

" Ninth day : No material alteration, and therefore *vaccinated* on the *right side* of the vulva, in seven punctures, with fifth, sixth, and seven-day lymph, on fourteen points, from a young child ; and *below* the vulva, in four punctures, with eight points.

" Tenth day of variolation, second of vaccination : Some of the variolated punctures hard and elevated ; but one, near the margin of the vulva, has assumed the form and appearance of the vaccine vesicle ; it is nearly circular, has an elevated margin, and a small crust in the depressed centre. By gently removing the central irregular crust, and carefully puncturing the cuticle from under which this appears to have exuded, lymph was obtained, and thirty-eight points were scantily charged in the course of an hour. Vaccinated punctures on the right side, rather red and elevated.

" Eleventh day of variolation, third day of vaccination : The circular indurated intumescence, forming the margin of the vesicle, somewhat flattened and diminished. Vaccine punctures more red, larger, and more elevated. *Evening:* more crust in the centre of the small-pox vesicle; margin less elevated. Vaccine vesicles advancing.

" Twelfth day of variolation, fourth day of vaccination: Margin of the small-pox vesicle more elevated and red; central crust darker; two of the other variolous punctures more tumid, but without lymph, still merely tubercular. Vaccinated punctures more tumid and inflamed.

" Thirteenth day of variolation, fifth day of vaccination: Small-pox vesicles more inflamed, nearly as florid as the mucous membrane of the vulva, which has lately assumed a bright rose colour. Every puncture made for the vaccine lymph (five days since) effectual, vesicles of different forms and sizes being now apparent. Charged some points from them.

" Fourteenth day of variolation, sixth of vaccination: Small-pox vesicle has less marginal induration, seems flatter, and crust partially loosened. Vaccine vesicles, some partly subsiding, some a little pustular, others still red, and all surrounded by indurated borders.

" Fifteenth day of variolation, seventh of vaccination: Small-pox vesicle enlarging; crust larger; indurated elevated margin of the vesicle quite circular, red, and glistening towards the centre. Vaccine vesicles larger and more elevated. Took from them more lymph.

" Sixteenth day of variolation, eighth of vaccination: Small-pox vesicle diminished; crust increased and loosening. Vaccine vesicles also diminished, some rather pustular; crusts brown and pale yellow, some crusts abraded partially, others loose.

" Seventeenth day of variolation, ninth of vaccination; Small-pox vesicle has scarcely any redness on its border; crust remaining. Vaccine vesicles diminishing, and covered with blackish brown crusts within their circular or oval margins, which are much flattened.

" Eighteenth day of variolation, tenth of vaccination: Small-pox vesicle very much flattened. Vaccine vesicles equally so, covered with black crusts of different sizes.

" Twenty-fifth day of variolation, seventeenth of vaccination: Scar of small-pox vesicle apparent: it is deep, wrinkled, and of a pale rose colour. Scars of the vaccine vesicles differ only in being smaller, less deep, and have more induration around them.

" March 12th: Re-inoculated with small-pox virus (confluent) of fifth and sixth day, in three punctures, several points, in the labium pudendi. Re-vaccinated in three punctures, several points, with sixth or seventh day retro-vaccine lymph, second remove. The next and three or four subsequent days the punctures were somewhat tumid, but soon again subsided. No result.

" *Experiment second.*—White sturk, thin skin. February 1st: Inoculated in seven punctures, near the left side of the vulva and on the under fold of the labium of that side, with fourteen points, charged, as in the Experiment, No. 1, from the same source; and with two setons, charged in like manner, near and below the vulva.

" Third day: Incisions tumid, encrusted.

"Fourth day: Less tumidity, less crust.

"Fifth day: Incisions appear healed; two or three more tumid than the rest.

"Sixth day: Some incisions more tumid.

"Seventh day: Less tumidity.

"Eighth day: Still tumid, but not advancing.

"Tenth day: Seem lymphless tubercles.

"Eleventh day: Tubercles less elevated; setons passive.

"February 15th: Re-inoculated with small-pox virus of the seventh and eighth day (variola discreta) on the left side of the vulva and under fold thereof, as before, and near the verge of the anus. Virus liquid, some pellucid, some opaque and puriform, in capillary tubes, was forced into eight punctures, which were deluged with it; the punctures being afterwards irritated with points deeply charged with the same, which were suffered to remain in the punctures.

"Third day: Nothing remarkable.

"Fifth day: Four upper punctures near the verge of the anus, enlarged and elevated; four on the under fold of the labium, elevated and red, but less enlarged.

"Sixth day: All present the appearance of the vaccine vesicle. The four upper are larger, but seem only tubercular; four lower, on the under fold of the labium, have a deep damask hue, and appear like oval or circular solid elevated rings, with central depressions; from one of these took clear lymph with much difficulty, and scantily charged thirty-nine points.

"Seventh day: Upper tubercles seem diminishing, lower vesicles seem flatter, but broader.

"Eighth day: Four upper appear still tubercular, of a lighter colour then their ground; four lower vesicles rather augmented, have a light damask hue. Took lymph again from one of them; the other three, not readily yielding lymph on a careful puncturing, were not further disturbed, from a desire to witness their progress; slight central crusts.

"Ninth day: The four vesicles enlarging; again opened the inner margin under the daily increasing central crust of the vesicle first opened, and charged twenty points; tubercles diminishing.

"Tenth day: One of the tubercles rather larger; four lower vesicles increasing. Charged twenty-seven points. Vesicles have a bluish, reddish, glistening appearance; two of them rather red at the base; one or two rather raw on each side.

"Eleventh day: Brown crusts cover the centre of the vesicles, which appear declining.

"Twelfth day: Declining, with increasing crusts of a blackish brown colour, within a slightly elevated margin. Vaccinated in several punctures on the margin of the right labium with many points, well charged with sixth-day retro-vaccine lymph; two removes. Punctures slightly tumid for a day or two, but quickly subsided. No result.

"March 12th: Four scars, as large as peas, in the situation of the four vesicles, depressed, pale rose colour. Re-inoculated with small-pox virus, (confluent), fifth day, in four punctures, on inside of left labium. Re-vaccinated in three punctures, many points, of fifth and seventh day lymph from a child. No result."—Pp. 382-387.

The experiment did not succeed in the third heifer, only producing a few lymphless tubercles, which subsided about the ninth day. Beautiful coloured engravings are given of the progressive appearances of the vesicles in these experiments.

Mr Ceely remarks, that on none of these animals could he detect any eruption, though the body was carefully inspected with that view; and as the animals were entirely free from fever, it may be supposed that none occurred. The animals employed were those which in all probability had never been the subjects of the vaccine disease, being all under four years of age. Cows would have been preferred, but in his neighbourhood cows were too valuable to permit being made the subject of experiment; besides, these young animals possessed this peculiar advantage, that he was allowed to keep them on his own premises during the whole continuance of the experiment, and was thus enabled to observe, with greater minuteness, the phenomena of the disease. These experiments were witnessed by a number of Mr Ceely's medical brethren, who also assisted him in their performance.

In the first of these experiments the variolous vesicle was evidently retarded in its developement for several days beyond what it was in the second experiment, or in the vaccine disease; and in this case the truth of Bryce's test was evidenced by the vaccine vesicle on the one side of the labium running its course, attaining its acme, and declining at the same time as the vesicle produced by the variolous matter on the other; and the scars left by the vaccine vesicles, like those attending Bryce's test-vesicles in man, exhibited induration and elevation of their margins much longer than the principal vesicle.

As so little is yet known of the circumstances which favour the reception of the variolous disease by the cow, Mr Ceely narrates many other attendant particulars, without, however, attaching undue importance to any of them. Thus he mentions that the small-pox was prevalent around the premises where his successful experiments were performed, and the cow-pox was extant in some distant dairies. The atmosphere was moist, but not very cold; the mean temperature of the month being 39.7, and the mean pressure of the barometer 29.62. There were thirteen rainy days in the month; seven days overcast, but without rain; and eight days fine, but with clouds. The prevailing winds were west, south-west, and north-west. He remarks that the failure of his experiment in the third heifer shows that much depends on the constitution and temperament of the animal, and the condition and texture of its tissues as influencing its susceptibility. In repeating his experiments this circumstance had been frequently brought under his notice; and in nearly half the number of cases in which he failed to effect inoculation with small-pox matter, retro-vaccination succeeded in a more or less perfect degree. In the remainder it was as unsuccessful as the previous inoculation with the variola.

These experiments of Mr Ceely seem to show that the system of the cow is more easily affected with the virus proper to its kind, than with that which, in the form we are accustomed to see it, is peculiar to man. Much, however, may depend on our yet imperfect means of communicating the disease, or introducing the poison into the system of the animal. Mr Ceely thinks that the nearer we approach to the practice of the best vaccinators of the cow, the milkers, the more likely are we to succeed; and that if it were possible to employ a number of small-pox patients to milk cows when their teats were chapped and cracked, we might expect a larger measure of success than by any other mode.

But the lymph obtained from these variola-vaccine vesicles had still to be tested on the human subject, in order to prove their perfect identity with the ordinary cow-pox matter. Mr Ceely entered on this with intense interest, and not a little anxiety, both from the knowledge of the unexpectedly fatal results which had attended some of the experiments of Mr Brown with the vaccine matter obtained from the cows at Sylhet in India, and from an incident which occurred to his assistant Mr Taylor. This gentleman, who had been vaccinated, and also had modified small-pox in infancy, punctured his hand between the thumb and fore-finger with the lancet which had opened the variolous vesicle in the first experiment above quoted. On the fourth day thereafter the spot was hard, deep red, and with papular elevation; on the fifth day there was papulo-vesicular elevation, a dark-red areola, and much pain. In the evening febrile symptoms appeared with roseola and fiery red papula on the face and body. On the sixth the elevation was more distinctly vesicular, the areola was more diffused and of a lighter colour, and the papulæ on the body and limbs appeared to have slight central depressions. On the seventh it was apparent the acme of the disease was over; the febrile symptoms were somewhat abated, and the areola was diminishing; the vesicle was more distinctly formed; and some of the papulæ had straw-coloured summits. On the eighth the vesicle was larger, but not active, and the papulæ were desiccating. The case, in fact, was modified vaccine in a sanguine habit, with roseola and vesicular or vaccine lichen.

The first experiment cannot be more concisely given than in Mr Ceely's own words:—

"I had inserted twenty points, charged from the variolous vesicle, on the tenth day, into five children, making four punctures in the left arm of each child, viz. James Bryant, aged two years, in delicate health, dark complexion; Ann Nicholson, aged one year, healthy fat, florid, but phlegmatic; Henry Gibbs, aged one year and three-quarters, very fair, healthy; Joseph Woodbridge, aged three years, robust and remarkably florid; George Woodbridge, aged five months, plump and healthy. In all, the punctures were early inflamed; but the inflammation subsided, and the papular stage was late in all—the sixth, seventh, or eighth day before it was possible to determine the probability of any result, when a dark dull red pimple occupied the place of some of the punctures, for many of them failed. Vesicles with areolæ were formed at different periods in each.

" Bryant, becoming ill with diarrhœa soon after vaccination, produced only one vesicle, with an areola at the height on the fifteenth day; the vesicle bluish and remarkably large. Nicholson yielded two fine vesicles with full areolæ, and two papulæ on the thirteenth day. Gibbs had but one vesicle, fine and pearl-like, with fully developed areola on the eleventh day. Joseph Woodbridge had two vesicles, attended with areolæ on the tenth day, which were very extensive on the twelfth, and did not decline till the fourteenth day. George Woodbridge entirely failed. Thus twenty punctures yielded but six vesicles. In all these cases the primary constitutional symptoms were very slight; the secondary proportioned to the extent and character of the areola: hence Joseph Woodbridge suffered severely, had vomiting, and delirium. No eruption was observed in any of the cases except his; he had extensive roseola.

" On three subjects, aged respectively eleven years, ten months, and two years and a-half, some of the remaining points were employed; into these, also were inserted, at the same time, points charged with ordinary vaccine lymph. In all three subjects the latter took effect in every punture; while only five out of eight punctures with the new lymph answered, papulation being tardy as before; while the old lymph advanced as usual. As the areolæ of the vesicles from this lymph began to form, the sluggish vesicles from the new began rapidly to advance, and ultimately ran the same course, but did not eventually attain the same size, though perfectly well developed.

Six points, charged with lymph taken from the vaccine vesicle of the fifth day, on the variolated sturk, were inserted into two subjects at the same time as points charged with lymph from the variolous vesicle of the tenth day. One, Emma Churchill, aged five years, produced, from three punctures with the latter, two *papulæ* only; but from three punctures on the right arm, with the former lymph, two very fine active *vesicles*, in which the areolæ began on the ninth day, and was fully developed on the eleventh. In the other case, Richard Tompkins, aged four years, both sets of punctures took effect, but those with the retro-vaccine lymph were more early developed; the areolæ of both commenced on the ninth day, and declined after the eleventh. The symptoms in both subjects appeared on the approach of the areolæ, and were rather severe during its activity. In the subsequent removes of the lymph from the variolous vesicle and the retro-vaccine vesicles, and when propagated from arm to arm, it appeared rather more energetic than the ordinary lymph. Trials were made of both on the same and on separate subjects. In the subsequent removes of the new lymph, in the liquid state, by trials on the same and on different subjects at the same time, it was impossible to discover the slightest difference in its course and effects, whether derived from the variolous vesicle of the tenth day, or the retro-vaccine vesicles of the fifth or seventh day."—Pp. 404–406.

The phenomena presented by the lymph taken from the vesicles produced on the second variolated heifer were very analogous to those above quoted. It is only necessary to mention that it was found that after the fourth remove "the vesicles were everything that could be desired, even on a puny, sickly, rickety child, aged two years and a-half."

Mr Ceely's remarks on the general character and progress of these vesicles are too important to pass over.

"In the majority of instances, in propagating from arm to arm, distinct papulation was apparent on the second day; on the third it was not only visible, but elevated and well defined; on the fifth and sixth, vesiculation was abundantly obvious, and lymph was often taken on those days; on the seventh day vaccination was frequently performed, and points were often charged; on the eighth the vesicle commonly exhibited a bold, firm, and glistening aspect; between this period and the ninth day the areola generally commenced; (but in young infants, with tense and sanguine skins, it appeared *early* on the eighth;) by the tenth day the vesicle was commonly in its greatest beauty and highest brilliancy, glistening with the lustre of silver or pearl, having the translucency and appearance of crystal, or shining with a pale blue tint, occasionally of a dull white or cream colour, bold and elevated, with a narrow centre and broad margin, or flat and broad in the centre with an acute margin, occasionally not raised above the level of the skin; on this and the eleventh day an extended and generally vivid areola existed, with more or less tension and induration on the integuments; at this time the lymph was frequently pellucid, and often perfectly efficient. From the eleventh to the thirteenth day, gradually encreasing; in many individuals, both children and adults, sometimes the entire vesicle, at others only the central parts, reflected a blue or slate-coloured tint from the congested or ecchymosed subjacent adventitious structures, proportioned to the texture and degree of translucency yielded by its desiccating epidermis. On the thirteenth and fourteenth day, particularly on clear skins, moderately thick, the vesicles attained a considerable size, measuring often in their longest diameters six and a-half or seven lines, and acquired a light-brown centre, from commencing desiccation, which was surrounded with an outer margin of dull white or pale dirty yellow, soft and flaccid, and still possessing fluid contents. During this period the areola, of a dull red or damask hue, would revive and decline again and again, and even to the sixteenth or eighteenth day, the period to which complete desiccation was frequently protracted. The crust commonly partook of the form of the vesicle; it was often prominent and bold, varying in colour from that of chestnut to that of a tamarind stone. It fell generally about the twenty-third or twenty-fifth day, often later.

"The cicatrices were of variable depth and extent. When the vesicles remained unbroken on a thick sanguine skin, they were deep; but on a thin skin, shallow; they were not always proportioned in width to that of the vesicle, the smallest cicatrix often succeeding the largest vesicle, but the later the crust fell, of course the deeper the cicatrix, which on these occasions was often beautifully striated. I need scarcely say that where the vesicles were accidentally broken, or spontaneously burst, much mischief ensued, deep sloughing of the skin, &c. &c."—Pp. 414-416.

"When the lymph in the first remove produced normal vesicles, and as soon as it had passed readily from arm to arm, the constitutional symptoms, though mild, were most commonly well marked. In infants, restlessness, fretfulness, and inappetency, about the fifth or sixth day, were very common; sometimes as late as the seventh day; very few escaped feverish symptoms on the ninth and tenth days; many had vomiting and diarrhœa. From childhood up to puberty, the primary symptoms, from the fifth to the seventh day, were unequivocally visible, and often complained of; fever, vomiting, delirium, and diarrhœa, were not unfrequently witnessed at the commencement or during the progress of the secondary symptoms. In adults, of course, more complaint was made; headach, chilliness, anorexia, and sometimes thirst, on the fifth or sixth day, increased on the seventh day, with axillary tenderness; but on the ninth and tenth days much general febrile complaint, disinclination, and even inability to leave the bed. But in several instances amongst young children, little or no complaint was made or indicated."—P. 417.

Excepting in the case of his assistant, Mr Taylor, no attendant eruption was observed in adults; nor in any child was there the slightest approach to anything of a varioloid character. In one case true varicella appeared six days after vaccination at the sixth remove. Roseola, strophulus, and lichen, were the principal eruptions observed. Supernumerary vaccine vesicles were frequently observed in the proximity of the punctures. This lymph has been extensively used both at the Small-pox and Vaccination Hospital at London, at the Cow-pox Institution at Dublin, at Cheltenham and at Bristol, and found equal to any at present in use.

Mr Ceely, in the concluding observations of his elaborate paper, adverts to the difficulty attending the transmission of the vaccine virus from the cow to the human subject, and also the frequent failures met with during its earliest transference from man to man. The lymph did not appear to become entirely humanized, so to speak, and become transferable with facility till the third remove from the cow. The same fact has been remarked by nearly every one who has had an opportunity of experimenting with fresh vaccine virus, so that it may be regarded as an established fact, that the matter undergoes some slight change by being transmitted through the human constitution, which renders it more capable of producing the vaccine disease in man. He pays a high compliment to the sagacity of Jenner, which led him to announce the fact, which is so strongly corroborated by the experiments of Mr Ceely, of the affinity between the vaccine disease and human variola.

The beautifully coloured engravings, thirty-five in number, which accompany this work, prevent the possibility of mistaking the author's descriptions; and, if at any future period, doubts should arise as to whether any degeneration has taken place in the activity of the vaccine virus, will prove of the highest value as a point of reference for the determination of that question.

ART. II.—*Crania Americana; or a Comparative View of the Sculls of various Aboriginal Nations of North and South America: To which is prefixed an Essay on the Varieties of the Human Species. Illustrated by seventy-eight Plates and a coloured Map.* By Samuel George Morton, M. D., Professor of Anatomy in the Medical Department of Pennsylvania College at Philadelphia, &c. &c. Philadelphia, London, 1829. Folio. Pp. 296.

THE mode of distinguishing the human race into varieties, according to the similitudes and differences of their external forms, and according to the corresponding characters presented by the skeleton, and especially the cranium, though attended with many difficulties and liable to not a few fallacies, is, nevertheless, the only one, in which it is possible to arrive at correct or useful notions regarding the peculiarities of the several families, as they have been denominated, of the human race. Though in the mixed races the characters are in a great degree blended together, or run into each other, yet in those which have been preserved pure or with little intercourse with other varieties, it is always possible to observe easily certain prominent characters, by which they are assimilated with each other, and distinguished from all the other groups, the characters of the external figure of which and of the skeleton are very different. Thus, though among the nations of the Caucasian race, there may be found many individuals with the characters of the Mongol variety, yet, when the purest specimens of the Caucasian race are compared with the purest specimens of the Mongol, the peculiar characters are recognized with little difficulty. The peculiar features also of the Ethiopian race, and the anatomical characters of their skeleton are so striking, that it is scarcely possible even for the superficial observer to overlook them.

Again, though it is undeniable, that in many nations it is difficult to ascertain the natural or normal figure of the cranium, in consequence either of the prevalence of particular customs, or the influence of articles of clothing, or the operation of certain occupations, or the practice prevalent among many tribes of compressing, moulding, and shaping the scull, according to some preconceived but very absurd notions of beauty and symmetry, yet by examining a considerable number of sculls, and especially by examining them at early periods of life, before the effect of these practices have had time to operate, it is always practicable to draw tolerably exact inferences regarding the amount of these changes, and consequently to form conclusions regarding the natural and unmodified shape of the scull. The shapes of the cranium in several of the aboriginal tribes of North and South America are often found deviating very widely from those of the human cranium, and so much deformed, according to our notions of symmetry and beauty, that it is impossible to place them in the same scale with the European or Asiatic crania. But when they are examined, either in infancy, before the artificial means of deformity have been allowed to produce much change in figure, or under circumstances in which the progressive effects of these changes can be appreciated, it is in general practicable to trace, amidst all these deranging and modifying agents, with approximative, if not with complete accuracy, the original, proper, and gentilitial shape of the cranium.

The first attempt to distinguish the varieties of the human race into classes was made by an anonymous author in 1684, who divided them into four stems or great divisions; the first, that occupying Europe, excepting the Laplanders; and including the inhabitants of Southern Asia, Northern Africa, and the whole of America; the second, the inhabitants of Central and Southern Africa; the third, the inhabitants of the rest of Asia, with the islands situate towards the south-east; and the fourth, consisting of the inhabitants of Lapland.*

Much about the same time Leibnitz proposed to distinguish the whole individuals of the human race into four large families;

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* Journal des Sçavans, 1684, p. 133.

two extremes and two means; the two first consisting of the Laplanders and the Ethiopians; and the two latter consisting of an eastern and a western branch, the former corresponding to the Tataric or Mongolian; and the latter to the European or Caucasian race.

Linnæus, the author of methods of classification in general, following the usual geographical distinctions, divided the human race into four varieties; the red or American; the white or European; the brown or Asiatic; and the black or African.

These distinctions of the Swedish naturalist were modified, amplified, illustrated, and embellished by the genius and eloquence of Buffon. The latter admitted six divisions; the Hyperborean or Lapponic, embracing all the Polar or Arctic nations; 2. the Tattar, including the tribes of Eastern and Central Asia; 3. the Southern Asiatic, including the South Sea Islanders; 4. the European; 5. the Ethiopic or African; and 6. the American. Subsequently by referring the Laplanders to the same stem as the Tatars, of which he regarded them as a degenerate branch, Buffon reduced these divisions to five.

Amidst these distinctions, founded mostly on external characters, Governor Pownall first directed attention to the peculiar configuration of the cranium in the different races, and thereby fixed the distinctions on a more stable foundation. He divided the race according to their predominant colours into three sections; the white, the red, and the black; and placed as a middle term between these, the Mongols on the one hand, and the Americans on the other.

Kant, the celebrated German psychologist, forms from the brownish or whitish-brown original inhabitants of the earth, four different varieties; the fair race of Northern Europe; the copper-coloured American; the black of Senegambia; and the olive-coloured or tawny of India.

Dr John Hunter, in his dissertation published in this city in 1775, enumerates seven varieties of the human race. 1. The black race, including Ethiopians, and Papuas or South Sea negroes; 2. the blackish race, including the Moors, and the aboriginal inhabitants of the Cape of Good Hope; 3. The copper race, or those of the East Indies; 4. The red race, or that of the Americans; 5. The brown race, or that of the Tartars, Arabs, Persians, Chinese, &c. 6. The brownish races, including the inhabitants of Southern Europe, as the Spaniards, Italians, &c., the Turks, Abyssinians, and the Samoieds and Laplanders; and, 7. The fair races, including the rest of the Europeans, and several Asiatic nations, as the Georgians, Mingrelians, and Kabardinians.

Little doubt can be entertained that this distribution of the human race, which rests more on the colour of the surface than either the analogy of external forms or the identical or similar characters of the skeleton, is fundamentally erroneous; and it has accordingly received comparatively little attention from physiological and anthropological inquirers.

Similar attempts at arrangement and division were made by Zimmermann, Meiners, Klugel, and Metzger; but all of them have been neglected and forgotten in the superior accuracy and conveniency of that proposed by Blumenbach, who placed that proposed by Buffon on the basis of anatomical characters, and, illustrating the different examples by figures of the most extensive and varied collection of sculls, thereby presented physiologists and naturalists with the means of ascertaining the correctness of his classification, and also illustrated the subject generally with a great deal of multifarious and interesting learning.

Blumenbach, admitting one single species of the human race, distinguished it into five varieties, 1. the Caucasian as the standard of the race, and the most perfect in the symmetry of form, the peculiarities of the skeleton, and the extent and energy of the mental faculties; 2. the Mongolian, corresponding to that erroneously named Tartar by Buffon; 3. the Ethiopian or negro variety, including the Papuas of the South Sea; 4. the American; and 5. and lastly, the Malay variety.*

The only points deserving consideration and inquiry in this classification are, whether the American and Malay varieties might not without violence be referred to the Mongolian stem, or might be regarded as intermediate between that and the Caucasian, and whether the external physical characters, and the anatomical characters of the skeleton of these two varieties, are more widely removed from those of the Mongolian stem, than the different sections or families of the Caucasian variety, or even of the Ethopian variety, are removed from each other.

Thus when we examine the sculls of individuals of these several varieties, though we observe palpable, perceptible, and striking differences between the Caucasian scull, the Mongolian, and the Ethiopian, and physical characters in these sculls sufficient to distinguish them from each other, we do not observe between the Mongolian and the American scull on the one hand, and the Malay on the other, differences so strong as to justify the inference that the latter two belong to a different variety from the former; much less can we say that the scull of the Papua or South Sea negro is essentially different from that of the African negro.

These and similar circumstances, doubtless, and the considerations which they suggest, induced Cuvier to refer all the tribes of mankind to three general stems; 1. the Caucasian or Asio-European; 2. the Mongolian or Altaic variety; and, 3. the Negro or Ethiopian or Austro-Atlantic variety. The only difficulty in this arrangement is, that its author thought it difficult, if not impossible, to refer to either of them the Malays, the Papuas, or the natives of the South Sea Islands. There is no doubt, however, that the Papuas, a race of men with crisp hair, black complexions, and negro features, inhabiting the Islands of the Indian Archipelago, are descendants of the Ethiopic breed, and must have come from adjoining eastern coast of Africa or Madagascar; and it seems impossible to consider the Malays as any other but descendants either of the pure Mongolian race, or of a breed intermediate between them and the Caucasian.

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* De Generis Humani Varietate Nativa. Auctore Jo. Frid. Blumenbach, M.D. editio 1ma, 1781. Editio Tertia, Goettingæ, 1795. J. F. Blumenbach, Collectionis Craniorum Diversarum Gentium Decades, 1mo, 2da, 3tia, 4ta, 5ta, 6ta, 7ma, Goettingæ, 1890, 1826.

If any circumstance could more clearly than another establish the fact of the difference of the three general varieties now mentioned, and the connected fact, that any other varieties must be modifications of these primary varieties, it is the strongly marked characters which are presented even by infant and junior crania of the different races, before it can be supposed that the shape of the scull has received any impression from external agents, or before the customs or fashions proper to certain tribes and nations can have had time to operate. Blumenbach delineates in his third decade, three crania from the three leading stems; the scull of a Jewish girl of five years, the scull of a Buraet child of six years, that is a child of a large and populous tribe of the Mongolian race, and the scull of a new-born negro; and each presents most strongly marked the distinctive characters of their respective races. Thus the scull of the Jewess follows the general spheroidal figure, presents the large, well-arched forehead, the facial part descending nearly in a straight line, receding at the alveolar arches, tapering at the chin, and well rounded over the parietal and occipital regions. The general character of the outlines of this scull is that of easy and gently softened rotundity. Nothing harsh or abrupt, nothing angular, prominent, or unsightly is perceptible. In the scull of the Buraet child, on the other hand, are seen the cuboidal figure of the whole scull, the broad flat forehead, the broad flattened face, with the prominent cheek bones, and the flattened square alveolar arches and jaws of the Mongolian breed. Lastly, in the Ethiopian infant, the elongated shape of the scull, the flattening of its lateral regions, the depression of the frontal and coronal regions, and the great anterior prominence of the alveolar arches, with the large proportion of cranium behind the *meatus auditorius*, are characters too distinctly marked to be overlooked.*

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* J. F. Blumenbach, Decas Tertia Collectionis suæ Craniorum Diversarum Gentium illustrata. Goettingae, 1795. 4to. Tab. b. xxviii. xxix. and xxx.

The same year in which the second decade of Blumenbach made its appearance, Sandifort published in the first volume of his *Museum Anatomicum* figures of the crania of the Calmuck, the Tartar, the Ethiopian or Negro, the Russian, and among the European nations, the Swede, Englishman, Frenchman, Italian, and the Hanoverian.* The only observation suggested by these figures is, that there is strong reason to believe, that the scull delineated as that of the Tartar or Tatar is indeed not a Tartar but a Mongol cranium. It is now known, that though the Tartars were believed to belong to the Mongol race, the genuine Tartars are in truth descendants of a branch of the Caucasian stem.

Soon after the time at which Blumenbach published the third decade of his collections of craniums, Soemmering, one of the most precise anatomists of Europe, gave some very correct characters of different national and tribual crania. His object, however, was not so much to fix the different varieties of crania as to specify the characters belonging to the varieties, and especially to particular nations and tribes.† In this respect, the characters given by Soemmering correspond nearly with those given by Blumenbach.

The next attempt to illustrate this department of the natural history of the human race was made by Dr M. J. Weber, Professor of Comparative and Pathological Anatomy in the University of Bonn, who, in 1830, published an able work on the primary forms and the generic varieties of the human scull and pelvis.‡ Professor Weber has in view in this publication not so much to distinguish the human race into varieties according to the form of the cranium, as to determine and illustrate what he regards as primary shapes in the form of the cranium, to explain the varieties of these, and then, without regard to generic or gentilitial distinctions, to refer the different sorts of sculls presented by the individuals of different nations to their proper respective stems.

Professor Weber enumerates four primary forms of the human scull; the ovoidal or spheroidal primary shape; the round or globular or spherical primary shape; the quadrilateral, or, in more accurate terms, the cubical primary shape; and lastly, the cuneiform or wedge-like primary shape.

The name of ovoidal, Professor Weber applies to sculls with moderately narrow frontal regions, becoming proportionally broader at the temples, and then gently and proportionally terminating at the occipital bone in an obtuse apex; with the facial part of the scull equally oval or elliptical, small and tapering at the chin, expanded over the alveolar regions, and gently rounded over the orbits and root of the nose.

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* Eduardi Sandifort, Museum Anatomicum, &c. Lugduni Batav. 3 vols. folio, 1793–1827.

† S. T. Soemmering De Corporis Humani Fabrica, Tom. i. Trajecti ad Molnina, 1794, p. 61–79 et 81–84.

‡ Die Lehre von der Ur-und Racenformen der Schädel und Becken des Menschen von Dr M. J. Weber, Prof. des Vergleichenden und Pathologischen Anatomie an der Universitat zu Bonn. Dusseldorf, 1830, 4to.

This primary form varies in the two sexes. The spheroidal cranium of the female is more round-oval. The transition at the regions specified, viz. the frontal, the temporal, the occipital, and in the facial regions takes place more gradually. Hence Weber distinguishes the ovoidal cranium into two varieties, the ovoidal or male ovoidal primary cranial shape; and the round ovoidal or the female ovoidal primary shape. As examples of this shape the author adduces the beautiful ancient Greek scull, delineated by Blumenbach in his 51st Table, and two sculls of a European, male and female.

The second primary form of scull recognized by Professor Weber is what he terms the round form, When the cranial portion of the scull below is broader and completely circular, so that the scull before, laterally, and behind is almost uniformly rounded, Professor Weber terms that the round, or what we would name the globular or spherical scull. The facial portion of the scull has a similar configuration. The jaw is more developed laterally, hence less prominent below.

To this category belong several European sculls, and especially that of the Jew; and Weber also refers to the same head sculls of the North American, the Brazilian, and the Calmuck.

The scull of the Israelite race presents several peculiarities. Blumenbach observed that the most remarkable peculiarities of the Judaic cranium are, 1*st*, the unusually large and strangely-shaped nasal bones, which produce the aquiline nose peculiar to the Jews; 2*d*, the upper jaw running pointedly forwards, and terminating in a large anterior nasal spine; and 3*d*, the quadrilateral and strongly advancing chin. To these marks Mulder has added another; namely, a pit which is situate on the outer wall of the orbit, where the temporal muscle is attached, and within the orbit, at the spot corresponding to the pit, an analogous elevation. This part Mulder seems to think must be produced by an action of the temporal muscle peculiar to the Jews in speaking and laughing, as in general the whole Jew physiognomy of the face and scull must be taken in connection with the mode of speaking peculiar to the Jews.

In the Jew scull delineated by Weber, that author observes in the nasal bones an anomalous disposition. The left nasal bone is strongly impressed; the right, on the contrary, less so at the apex. Both nasal bones are long; the left is broader than the right; and both bones are very obliquely roof-like.

The upper jaw does not project forwards, but is quite perpendicular, and is broad below; the alveolar processes are rounded, and form the segment of an arch or circle. The orbits are deep and rounded; the root of the nose is moderately broad.

The malar bones project laterally in a moderate degree; but of the pit and elevation of Mulder, Weber found no trace. The superciliary arches are feebly marked.

The third variety admitted by Weber is the quadrilateral, or what we should term the cubical or cuboidal form of scull.

This name quadrilateral Professor Weber applies to designate sculls which at their different sides or planes, that is anteriorly, on the temples, and behind, are flat and similarly impressed. The facial portion is also flat and broad. The nasal bones are more perpendicular, and are more developed in the transverse than in the angular direction. The jaws are in like manner developed laterally, and are also broad; and the outlines of the sculls are more angular, and less softened and rounded into each other, than in the globular or spherical cranium.

Further, the quadrilateral or cubical crania are distinguished into the oblong cubical, in which the antero-posterior diameter is long, or the cuboidal, in which the antero-posterior and transverse diameters are nearly equal.

As examples of this class Professor Weber gives two cuboidal sculls of Europeans, male and female, the former example adduced by him making a near approach to the scull of the Rein-deer Tonguse given by Blumenbach, (Tab. xv. *Decas Altera,*) the cuboidal scull of the Yacut, given by Blumenbach, (Tab. xv.); and the cuboidal scull of a Buggess.

From these facts it results that the differences between some of the European craniums and those of the Mongol and Malay variety are not so strongly marked, as from Blumenbach's characters we are taught to infer. The Rein-deer Tonguses, and the Yacut are both regarded as examples of the Mongol race; and the Buggesses are as certainly regarded as members of the Malay family. When, therefore, we find these and European crania arranged under the same category, the conclusion is, that there is less distinction in the crania of different varieties than might be imagined, and that several of these distinctions must depend on other causes than generic or gentilitial characters.

The fourth division of Professor Weber consists of the cuneiform or wedge-like scull. This denomination is applied to sculls that are long and narrow, and equally compressed on both sides. The upper jaw is particularly narrow, prominent, and stands obliquely with the teeth. From this long narrow shape of the whole scull, such crania appear like wedges.

This form of scull is evidently that which is described as proper to, and characteristic of, the Negro or Ethiopic variety. Weber gives as instances of it a cuneiform scull in a European male and in a European female; the scull of a Caffer; the scull of a Nukahiwer; and the scull of a Moor, the last from the first decade of Blumenbach. He admits, however, that the last mentioned scull is neatly rounded behind, and almost globular, though the general cuneiform shape is such as not to be mistaken.

After fixing these as primary forms of the human scull, Professor Weber compares with them as standards the crania actually presented by the different nations, tribes, and families of mankind; and the general result of this comparison is to establish the conclusion, that these forms glide into each other, and that there is no individual class of forms of the human scull, in which the marks of the other classes may not be found. "When we compare," says he, "without prejudice, with the primary forms, the forms of the cranium presented by the several races, we find that the first four divisions of Blumenbach, the Caucasian, Mongol, Ethiopic, and American, with respect to the varieties of scull, accord sufficiently well with the four forms of sculls described by us. Thus the characters of the Mongol configuration are found expressed most distinctly in the cuboidal scull of the European female, (Plate ix.) and the cuboidal scull of the European male (Plate x.) Again, the characters of the Ethiopic race are found in the European sculls of Plate xiv. xv. and xvi. And the characters of the American race are as clearly presented by the globular scull of the European in Plate iv. and the globular scull of the Jew in Plate v. Lastly, he observes that the character of the Malay race we find frequently in European sculls.

Professor Weber also argues that, however similar the individual sculls of the same race may be to each other, and however distinct the characters of the races may seem to be in well-marked sculls, yet between the sculls of the same race often the greatest differences are observed, so that often the pure general figure of the race is altogether obliterated, and actually here and there in one race forms take place which belong to another race, and that in general no individual sign or character of any definite race is so constant or appropriate that it may not be met with in other races.

In illustration and confirmation of these inferences, Professor Weber adduces the following facts.

1. Among the Europeans are found not only different varieties in the shape of the scull, but these different forms agree with the forms represented as peculiar to other races.

2. If the Mongol sculls are compared, great differences are also recognized among them. Thus the Yacut scull is cuboidal, while that of the Calmuck is roundish or globular. Weber here mentions an argument which, it appears to us, is founded in error. He states that Rudolphi observes, that Blumenbach refers all Tartars to the head of the Mongol category or race; while they ought to be distinguished from these. Part of them, for instance, the Kerghises and Kalmucks, belong to the Mongol family; but others, as the Baschkirs and the Tcherkesses belong to the European

stem. The Baschkirs, he observes, came to Berlin in multitudes during the last war; and they presented no Mongol feature in the shape of the head.

This statement by Rudolphi appears to us to be founded in some mistake. So far as we understand Blumenbach's language, both in his Essay on the Native Variety of the Human Race, and also in his Decades, we conceive that he not only regarded the Tartars as belonging to the Caucasian or Asio-European stem, but that he was among the first to rectify a common error regarding the Tartars as a family or tribe of the Mongols. Blumenbach, indeed, states explicitly in his second Decade, published in 1793, that Erxleben, in other respects a correct observer, had been led into the error of ascribing to the Tartars the characters of the Mongol cranium, by following the example of Buffon; and he takes credit to himself for showing that the general source of this error among all anthropologists was a letter of Yvon, a clergyman of Narbonne, who flourished in the middle of the thirteenth century, and recorded by his contemporary Matthew of Paris, the monk of St Albans; and he concludes by saying, "we know, on the contrary, the Tartars to be handsome men, remarkable for graceful and symmetrical countenances, such as are represented by the cranium here delineated, (a Casan Tatar,) differing widely from the flat and expanded face of the Calmuck."

3. The characters believed peculiar to the Ethiopian scull may also be wanting in it, and may be found in the sculls of the Caucasian stem. This is partly admitted both by Blumenbach and Soemmering. The prominence of the upper jaw and the flattening of the lower nasal apertures are allowed to be the most constant characters of the negro cranium. Yet Weber has seen, as well as Blumenbach and Soemmering, several negro sculls, in which the said smoothing was entirely wanting, or in which the jaw was less prominent, and the other characters still less determinate.

4. That many of the American tribes disfigure their sculls, and that we do not yet sufficiently know the true character peculiar to them, is a fact too well known to require to be further explained.

Dr Morton, to whose work we now come, in an able preliminary Essay on the Varieties of the Human Species, adopts the arrangement of Blumenbach, not as a perfect system, but as the most complete that has yet been attempted; and, employing the term Race instead of Variety, subdivides the five races into several distinct families in the following manner.

The Caucasian race he distinguishes into seven families; 1. the Caucasian proper; 2. the Germanic; 3. the Celtic; 4. the Arabian; 5. the Lybian; 6. the Nilotic; and 7. the Indostanic family.

The Mongolian race he distinguishes into five families; 1. the

Mongol-Tartar family; 2. the Turkish family; 3. the Chinese family; 4. the Indo-Chinese family; and 5. the Polar family.

The Malay race he distinguishes into two, the Malay and the Polynesian family.

The American race he distinguishes into two families, the American and the Toltecan.

Lastly, the Ethiopian race he distinguishes into six families; 1. the negro; 2. the Caffrarian; 3. the Hottentot; 4. the Oceanic negro; 5. the Australian; and 6. the African family; making in all 22 families.

Dr Morton gives a learned and instructive historical sketch of these different families, in which he illustrates his own arrangement by a large and instructive body of evidence. Our limits will not allow us to enter into any detailed examination of this sketch, which we recommend to the perusal of those interested in the natural history of the human race. We shall merely advert to that part of it relating to the illustration of the subject, which forms the principal object of his work, namely, the craniums of the aboriginal inhabitants of America.

The American race, we have already said, Dr Morton distinguishes into two families, the proper American and the Toltecan. This he regards as the most natural division, and restricts the term Toltecan to those nations which bear evidence of having been, for centuries at least, in a state of demi-civilisation; such, for instance, as the Peruvians and Mexicans; while he leaves for the general head of the American family, all the barbarous nations of the new world, excepting the Polar tribes, or Mongol Americans. The Eskimaux, which have been by some referred to the same head of American race, he thinks, are to be regarded as a partially mixed race, with predominance of the physical character of the Mongol, while their language presents obvious analogies to that of the Chippewyans, who border them to the south. He regards them, in short, as consisting of the Mongol and American race mixed.

The American family itself, Dr Morton thinks, may be further distinguished into several subordinate groups or subdivisions in the following manner.

1. The Appalachian branch, including all the nations of North America, excepting the Mexicans, together with the tribes north of the river Amazon, and east of the Andes. The head is rounded, the nose large, salient, and aquiline; the eyes dark-brown, and with little or no obliquity of position; the mouth is large and straight, the teeth nearly vertical, and the whole face triangular. The neck is long, the chest broad but rarely deep, the body and limbs muscular.

2. The Brazilian branch spread over a great part of South America east of the Andes, and includes the whole of Brazil and

Paraguay north of the 35th degree of south latitude. In physical features they differ little from the Appalachian branch,—possessing only a larger and more expanded nose, and larger mouths and lips.

3. The Patagonian branch, including the nations south of the La Plata to the straits of Magellan, and the mountain tribes of Chili. These are mostly distinguished by tall stature, fine forms, and great courage.

4. The Fuegian branch,—inhabiting the large island of Terra del Fuego, called by themselves the Yacannacunnee, of low stature, seldom exceeding five feet four or five inches, with large heads, broad faces, and small eyes.

Dr Morton, after examining a great number of sculls of the American race, finds that the nations east of the Alleghany mountains, with kindred tribes, have the head more elongated than any other Americans. This is particularly the case with the great Lenapé stem, the Iroquois, and the Cherokees. To the west of the Mississippi, again, the elongated head is seen in the Mandarins, Ricowas, Assinaboins, and some other tribes. In these tribes, however, the characteristic termination of the occiput is more or less obvious; while many nations east of the Rocky Mountains have the rounded head so characteristic of the race, as the Osages, Ottoes, Missouris, Dacotas, and many other tribes. The same conformation is common in Florida; but some of these nations, Dr Morton thinks, are of the Toltecan family, as testified by character and traditions. The head of the Charibs, both of the Antilles and of the adjoining coast of Terra Firma, is also naturally rounded; and this character is traced through the nations east of the Andes, the Patagonians, and the tribes of Chili. The flatness of the occipital region of the scull, he thinks, is the characteristic of a greater or less number of individuals in every existing tribe, from Terra del Fuego to the Canadas. If their sculls be inspected behind, the occipital outline is observed to be moderately curved outwards, wide at the occipital protuberances, and full from those points to the opening of the ear. From the parietal protuberances there is a slightly curved slope to the vertex, producing a conical or rather a wedge-shaped outline.

Humboldt remarked in the American Indian race the great backward depression of the frontal bone, and the smallness of the forehead. Dr Morton, however, observes, that the lowness of the forehead is in some measure compensated by its breadth, which is generally considerable. The flat forehead was esteemed beautiful among many tribes; and this was the inducement to moulding the head by art.

The eyes are generally deeply set or sunk in the head. Their position, however, is not oblique, except in some Brazilian tribes, and the natives of the Orinoco. The superior margin of the bony orbits is but slightly curved; while the inferior margin may be compared to an inverted arch. The lateral margins form curves intermediate between the other two.

The nose constitutes the strongest and most uniform feature in the Indian countenance. Without being strictly aquiline, and still more rarely flat, it usually presents the decidedly and strongly arched form. The nasal cavities correspond to the nose itself, that is, they are extensive and capacious; and the acuteness of smell possessed by the North American Indian was attributed by Blumenbach to the great expansion of the Schneiderian membrane. Dr Morton, however, justly remarks, without controverting this anatomico-physiological proposition, that the perfection of this sense, and also that of sight, in the American Indian tribes, depends mostly on the constant exercise of these senses, and incessant demands for this species of exercise.

The cheek bones are large and prominent, and incline rapidly towards the lower jaw, giving the face an angular configuration. The upper jaw is often elongated and much inclined outwards; but the teeth are, for the most part, vertical, approaching in this respect to their direction in the European or Caucasian race. The lower jaw is broad and ponderous, and truncated in front. The teeth are very large and seldom decayed; among the many that remain in the sculls procured by Dr Morton, very few present any marks of disease, though they are often much worn down by attrition in the mastication of hard substances.

The prevalent colour among these tribes, Dr Morton agrees with Dr Macculloch, in considering to be not that of copper, as it is commonly said to be, but approaching to cinnamon; and he regards the epithet of brown as most characteristic of the race.

Dr Morton gives an interesting history of the physical and moral and intellectual qualities of the American Indians, which we regard as the most complete yet laid before the public.

In respect to intellectual faculties, Dr Morton adduces evidence which shows that they are inferior to the families of Caucasian or Mongolian origin. Many attempts have been made to impart to the young Indians the benefits of moral, religious, and intellectual education; but in a very small number of instances has any progress been made in weaning them from the habits of their forefathers, or reconciling them to those of civil life. Instances have occurred in which Indians had been educated and trained to professions; but they always embraced the first opportunity of escaping and returning to their ancient haunts and original habits. It is proper to add, nevertheless, that Dr Warren, a very competent judge on this point, ascribes this inaptitude in intellectual faculties, or rather what might be termed aversion to the restraints of civilized life, rather to injudicious cultivation and inadequate means of instruction, than to any intellectual inferiority or incapacity.

The truth is, that the American Indians have been introduced to the habits of civilized life under most unfavourable circumstances. They have been made familiar with the vices and bad qualities of the Europeans, rather than with their virtues, and they have been often the dupes of the treachery and artifice of Europeans. It is not wonderful, therefore, that they evince no liking to civil society, and show on all occasions a desire to shun it. But, independently of these circumstances, it must further be allowed, that it is unreasonable as well as unphysiological to expect that, in the course of a single generation, the full and legitimate effects of education and training can be accomplished. When we consider how many ages have been required to bring the nations either of antiquity or of modern times to those states of polish and intellectual elevation, with which the Americans are compared, we must allow that it is not very natural to expect that, in the short space of a single lifetime, much less a part of a lifetime, that complete change can be effected in tastes, habits, and modes of living, which takes so long a period under other circumstances.

One of the great peculiarities in the intellectual character of the American Indians is their singular and utter incapacity to perceive the relations of numbers, or to form distinct and accurate notions of numerical magnitudes. In consequence of this extraordinary inaptitude, Dr Morton observes, they never understand any of those bargains or commercial transactions in which they are engaged with Europeans; and the transaction is consequently concluded without their forming any accurate notion of the value or amount which they are to receive; and it is only when it is received, and each has his share, that they understand the value; and then when they are disappointed, which happens in the greater number of instances, discontent and dissatisfaction are the natural and unavoidable consequences.

This incapacity is assuredly one of the strongest and most evident marks of intellectual inferiority in one important respect. We say one respect; for we do not conceive that it necessarily implies intellectual inferiority in all respects.

The experience of most of our readers will enable them to remember many excellent persons of good average vigorous intellect and judgment in all other respect, and yet who are strangely deficient in this faculty of understanding or perceiving the relations of numbers, and who cannot, by any effort of their own or any aid from others, be made to form distinct ideas of numerical magnitudes. Conversely, there are seen individuals who have remarkable calculating powers, yet whose judgment is not remarkable in any other respect, either in the way of comprehensiveness or energy.

Under the head of the Toltecan family, Dr Morton arranged the civilized nations of Mexico, Peru, and Bogotoz, extending from the Rio Gila, in the 33d degree of north latitude, along the western margins of the continent to the frontiers of Chili. In North America, however, he observes that the people of this family were spread from ocean to ocean through the present intendencies of Mexico, Vera Cruz, Puebla, Oaxaca, Guatimala, Yucatan, Nicaragua, &c. In South America, this family occupied a narrow stripe of land between the Andes and the Paupa, and were confined on the south by the great desert of Atacama. Further south, in what constitutes the present republic of New Granada, lived the Bogotese, a people whose degree of civilization, analogous to that of their geographical position, was intermediate between that of the Peruvians and Mexicans.

The nations of the Toltecan family seem to have been remarkable for their superiority in intellectual faculties and in the cultivation of those arts which are at once indications of, and necessary to, the existence of a certain degree of civilization. All these nations appear to have been divided into two orders, an aristocratical and a plebeian, both as incapable of mutual union or amalgamation as in the oldest and most despotic monarchies of Europe. The arrival of the Spaniards, partly by destroying the nobles, partly by abasing them, reduced both classes to the same degrading vassalage; and it is now no longer possible to recognize in the present inhabitants of Mexico or Peru, the qualities which might be expected in the descendants of the noble families of these ancient and high-spirited nations.

Their progress in the arts, especially of road-making, architecture, and fortification, are attested by the remains which the traveller and antiquarian still often meet and behold with equal astonishment and delight.

Dr Morton first considers and gives different views of the scull of the ancient Peruvians. These are obtained partly, if not entirely, from the arid region of Atacama, a sandy and saline desert waste, which separates the kingdom of Peru from that of Chili, and is nearly one hundred leagues in length. The dryness of the climate tends rather to the desiccation and consequent mummification than the decomposition of the dead, and the mixed sand and salt of the soil contributes to the same end. The result is, that in this desert, which was for ages the favourite sepulchre of the Peruvian natives, are contained the lifeless remains of entire generations of the Peruvians, the bony parts of which may still be examined, in a state of great integrity, after the lapse of hundreds, perhaps thousands of years.

From the examination of, at least, one hundred crania, obtained from such sources as this, Dr Morton has arrived at the conclusion, that Peru was at different times peopled by two nations of differently formed crania, one of which is probably extinct, or exists only as blended by adventitious circumstances in various remote and scattered tribes of the present Indian race. Of these two families, that which was antecedent to the appearance of the Incas is designated as the ancient Peruvian race, the remains of which have been hitherto found only in Peru, and especially in that division of it now called Bolivia. Their tombs, according to Mr Pentland, abound along the shores, and in the islands of the great lake Titicaca, in the inter-alpine valley of Desaguadera, and in the elevated valleys of the Peruvian Andes, between the latitudes of 14° and 19°. 30′ south. The country round this inland sea was called Collao, and the site of what appears to have been the chief city bears the name of Tiaguanico.

Any knowledge possessed of this race is derived solely from the remains found in this vast cemetery. In stature they appear to have been not remarkable. The head, which presents the chief marks of difference, is small, greatly elongated, narrow, with a very retreating forehead, and possessing more symmetry than is usual in sculls of the American race. The facial portion of the cranium projects; the upper jaw is thrust forward; and the teeth are inclined outwards. The orbits are large and rounded; the nasal bones are salient; the zygomatic arches are expanded; and there is a remarkable simplicity in the sutures connecting the bones of the cranium. A view of such a scull is given in Plate v.

The first idea that occurs on examining a series of these sculls, is that their peculiarities are in a great measure artificial. Dr Morton thinks, however, that this idea is contradicted by the characters presented by the scull in Plate iv. and the accompanying woodcut outlines, in which he maintains there are no perceptible evidences of mechanical compression. The scull here delineated he represents to be one of the ancient Toltecan race most completely unchanged by art.

In proof of the correctness of this opinion, Dr Morton argues, that, wherever the frontal or coronal region of a naturally round head, has been flattened by artificial compression, the posterior and lateral regions become proportionally expanded, " in order," he says, " to make room for the brain that has been displaced from the anterior region." Thus, among the specimens seen of this syncipital and coronal depression, from the tribes on the Columbia river, the ancient inhabitants of Venezuela, the Charaibs of the Antilles, and some tribes of the Peruvians, all which nations have naturally spheroidal heads, Dr Morton states, that the result of compression of the frontal and coronal regions is to produce extrusion and projection of the lateral and occipital regions. The sculls of the ancient Peruvians, on the other hand, seldom present much lateral expansion; but, on the contrary, are as remarkable for their narrowness as for their elongation. The frontal region also is so uniformly low, that they might be thought to belong to the negro or Ethiopian race, were not this idea completely contradicted by the appearance of the hair, which in all the bodies is long, lank, and smooth, and appears to have been worn at full length by both sexes.

Dr Morton admits, however, that in some instances the scull may have been moulded and compressed by artificial means.

In the pure ancient Peruvian scull, as supposed to be unmodelled by art, the most obvious characteristics are the following. The frontal bone much depressed, and extending with little arch backwards; the facial region oblique; the orbits horizontal; the two halves of the frontal bone and the two parietal bones rising and forming a prominent longitudinal ridge along the course of the sagittal suture; the malar bones prominent laterally, and the zygomatic prominent and square; the basilar region of the scull square transversely, so that the two mastoid processes and the occipital spine form as it were one straight line; the lower jaw square and almost quadrangular; and a large portion of scull behind the *meatus auditorius externus.* When the adult scull is compared with that of the child, it is easy to see how much or how little is the effect of art on the head-dress worn by these people. The frontal bone is still depressed, at least it does not rise in its facial portion in the direct manner in which it does in the ancient Greek scull, neither does it form the bold well-marked forehead observed in the Asio-European variety.

Dr Morton gives specimens, (for instance that in No. 5, Plate vi.,) of craniums, in which artificial means had been employed to flatten the frontal region; but he argues that the frontal region must in this case have been naturally very much depressed; because the lateral projection is trifling or imperceptible.

The second division of sculls consists of those which Dr Morton thinks belong to the Inca or modern Peruvians. It is well known, from the history of Clavigero and other sources, that the ancient race the Toltecas, after governing the country of Mexico for four centuries, were induced, by a succession of national misfortunes and calamities, to abandon it altogether about the one-thousand and fiftieth year of our era. They migrated in large bodies to various parts of South America, and extended themselves as far as Yucatan. As the Inca race date their possession of Peru from the eleventh century, the era of the migration of the Toltecas, Dr Morton thinks it reasonable to conclude, that the Toltecas and the Incas were sprung from one common origin.

But whether this view be well founded or not, Dr Morton thinks that every circumstance shows that the modern Peruvians differ from the nations around them. They are of middling stature, well-limbed, and with small made feet and hands. Their faces are round, their eyes small, black, and rather distant from each other; their noses are small, the mouth somewhat large, and the teeth very fine. Their complexion is of a dark-brown, and their hair long, black, and rather coarse.

"The scull in these people is remarkable for its small size, and also for its quadrangular form. The occiput is greatly compressed, sometimes absolutely vertical; the sides are swelled out, and the forehead is somewhat elevated, but very retreating. The capacity of the cavity of the cranium, derived from the measurement of many specimens of the pure Inca race, shows, as we shall hereafter see, a singularly small cerebral mass for an intelligent and civilized people. These heads are remarkable not only for their smallness, but also for their irregularity; for in the whole series in my possession, there is but one that can be called symmetrical. This irregularity chiefly consists in the greater projection of the occiput to one side than the other, showing in some instances a surprising degree of deformity. As this condition is as often observed on the one side as the other, it is not to be attributed to the intentional application of mechanical force; on the contrary, it is to a certain degree common to the whole American race, and is sometimes no doubt increased by the manner in which the child is placed in the cradle."—P. 115.

Dr Morton, indeed, is convinced that, among the collection of craniums above-mentioned, not one has been designedly moulded by art; and he thinks it may reasonably be inferred, that individuals of the royal race, or those forming the higher classes among the Peruvians, seldom or never flattened their heads. He thinks, that, as a certain degree of depression or flattening of the frontal region was natural to the royal and noble class, this was attempted to be acquired by art by the common people.

Most of the sculls of the modern Peruvians, which were obtained either from the temple of the Sun at Pachacamac, or from the other cemeteries of the modern Peruvian race, present elevated or prominent vertices, more or less posterior and lateral extrusion, and the same square or angular shape at the posterior basilar line, running between the two mastoid processes. The sculls delineated in Plate vii., copied from Plate viii. and xi. C. of Dr Morton, present, in a very clear light, these characters, and especially that of the lateral bulging, which is so considerable as to project beyond the lower part, and also the facial region, of the cranium.

Next to the Peruvian, Dr Morton gives figures of the Aturian, the Brazilian, and the Botocudo scull.

The Atures were a powerful tribe near the sources of the Orinoco, now extinct. Baron Humboldt discovered a burying-place of this race, in which were deposited, at least, 600 skeletons, all in a state of good preservation. The specimen delineated by Dr

Morton presents the large face and ponderous bulky lower jaw peculiar to the American race, with the retreating forehead, prominent cheek-bones, and large orbits. One of these has been already delineated by Professor Blumenbach in his 46th Plate, Decade V., and it is necessary only to say, that he remarks the greater difference between it and the Mongol, than between it and the Ethiopic cranium; the zygomatic ridges, not so flattened, projecting more outwards than in the Mongol, but broader than in the Ethiopian; and the depressed receding forehead, divided, as in the Peruvian race, by an elevated linear ridge passing along its middle. The Aturian scull is represented in Plate viii. fig. 1.

The Brazilian scull, male and female, was also delineated by Blumenbach, (47 and 48, Dec. V.) The male scull represented by Blumenbach is a sort of preserved or mummified head, and gives the outlines of the osseous characters less clearly and strongly than a bare cranium would have done. In the female scull, which is small and well-shaped, the frontal bone is globular, the nose more depressed than in the male, the upper jaw not very prominent, and the arch of the lower jaw elliptical, not, as in the Negro, parabolical.

Dr Morton gives as instances of the Brazilian scull views of the scull of the Puelché or Patagonian tribe, and the Charrua or Brazilian race. Their characters, though not enumerated, are much the same as those of the American cranium in general.

"The largest cranium gives an internal capacity of 80.5 cubic inches, which is a fraction short of the Caucasian mean: while the smallest head measures but 60 cubic inches. The mean of the whole series gives but 73 cubic inches, which is probably lower than that of any people now existing, not excepting the Hindoos."

Among the Brazilian sculls also is ranked that of the Botocudi. The first delineation of the Botocudi cranium was given by Blumenbach in 1820 in the 68th plate (Decade VI.) from a scull brought to Europe by Maximilian, Prince of Wied-Nieuwied, who spent a considerable time among the barbarous tribes of South America in the study of natural history. The Botocudi have acquired the reputation of cannibals. It appears from the best testimony that they are the most horrible barbarians in savage life that cumber the earth. They are probably equalled by some of the savages among nations calling themselves civilized; but it is scarcely possible to find their like among the still barbarous races. They cut from the wood of the *Bombax ventricosa* orbicular or oval discs, very similar in shape to the large orbicular pieces of wood used as plugs to close apertures in casks. These are called in the Portuguese language *Botoques;* and of these Botoques each barbarian has one appended to each ear, and a third fixed in a deep slit or notch in the lower lip. From this circumstance these wretches are distinguished by the appropriate appellation of *Botocudi* or *Botoquudi*; and the effect of the practice is not only to give them a most hideous aspect, but to cause the loss of the lower incisor teeth before the age of 30, so as to leave in every one of their lower jaws a deep indentation shaped like the impression of the finger in wax.

The scull delineated by Blumenbach is again represented by Dr Morton. It is large, and its bony structure is very dense and hard, and the whole scull is consequently ponderous. The former thought, that, disregarding the lower jaw, the figure and interval of the orbits, the prominent nasal spine, and other characters peculiar to man, it approaches, in general aspect, more nearly to the scull of the orang outang, than other scull of any barbarous race in his collection.

The notch in the site of the incisor teeth of the lower jaw is very distinct in the engraving of Blumenbach.

The next to which we shall direct attention are the Mexican sculls, represented in a series of five plates, from 16 to 18 A. The leading characteristics of these sculls are very similar to those of the ancient Peruvian. Several of them present the same lateral swelling or bulging, the same depression, but with expansion of the forehead, and the same elevation of the vertex. In Plate 17, A. and 18, these characters may be easily recognized. In the latter, especially, may be perceived the lateral prominence, the vertical elevation, and the square or quadrilateral outline of the basilar region.

The cranium of the Natchez, which comes next, is a very singular specimen of a human scull; and as no words can convey an adequate idea of its peculiarities, we subjoin a copy of one of Dr Morton's figures. (See Plate ix.) The Natchez are supposed by Dr Morton to be descendants of the great Toltecan branch of the American stem. They lived excluded from intercourse with the adjacent nations, excepting the Chetimaches. They inhabited the banks of the Mississippi, in three principal villages near the city which still bears their name. But the last remnant of the nation not long ago occupied a small village on the Talipoosa river in Alabama. During the late war between the United States and the Creek Indians, these Natchez joined the army of General Jackson; but since that period their name is known only in history. The Natchez as a nation are extinct.

The cranium is flat in the frontal region, but singularly elevated, especially toward the vertex, so that the portion of scull above the orbits is much greater than that below. If indeed the scull and lower jaw be divided into three equal portions by one line passing by the zygoma, and another about one inch above the squamo suture, two-thirds of the scull at least are above the first line, viz. that which passes by the zygoma and the external ear-hole.

It is impossible to doubt that this scull must have been moulded by art to the strange and unnatural shape which it presents. Yet, amidst these effects of artificial modelling, the scull has not lost its original gentilitial characters. The only character that is not retained is the retreating and depressed forehead, that region being much more elevated and nearer the perpendicular than usual in the present scull. But the same large interval between the orbits, the same bulging of the parietal regions, and the same prominence of the malar bones, and quadrangular configuration of the lower jaw, are here perceptible as in other specimens of the American cranium.

Similar deformity is observed in the cranium from a mound high up the Alabama river, and which Dr Morton supposes to belong either to a Choctaw or Natchez Indian, probably the latter.

Dr Morton gives next views of the craniums of the Chetimouches, which should have preceded in the proper order, the Natchez, the Seminole Indians, Muskogee or Creek Indians, the Cherokees, the Uchees, the Algonquin Lenapé, the Chippeways, the Menominees, the Miamis, the Ottigamies, the Oneida Indians, the Cotonay Indians, and all the other multiplied native tribes, which inhabit the western part of the North American Continent.

Our limits do not allow us to follow the author into the detailed examination of the numerous sculls which he has here represented ; amounting to between forty and forty-five in this division alone. Nor is it requisite ; since the whole of these crania agree in certain general characters, however they may differ in particular circumstances. The Oneida scull in Plate x. may be taken as the general type of the whole.

All of them present the oblique, retreating, or depressed frontal region, the projection of the occipital and parietal regions, though in very different degrees, the quadrangular aspect and outline of the lower part of the cranium, and especially of the lower jaw, which often seems to be quite rhomboidal.

This department of craniography had been also already illustrated by the labours of the indefatigable Blumenbach, who gave in his first decade, published so long ago as 1790, that is, fifty years ago, a figure of the scull of a North American Indian, (Tab. 9,) and specified at the same time the essential osteological characters. The essential or primary characters are the following.

The vertex depressed, large, protuberant towards the sides above the temples, the semicircular planes diverging on each side thence, from the orbital process of the frontal bone upwards. The malar bones prominent. The olfactory cavities most capacious, so that the middle turbinated bones are, as if hollowed into bladders, and contain sinuses of remarkable capacity.*

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* J. Frid. Blumenbachii Decas Collectionis suæ Craniorum, &c. Gottingae, 1790, p. 24.

Ten years afterwards, in 1800, in his fourth Decade, Blumenbach gave another figure illustrative of the craniography of these tribes, by representing the scull of an Illinois Indian, in his 38th figure. In this cranium, the coronal region is obliquely depressed, but the vertex elevated like the keel of an inverted boat, the orbits are very deep, and the lower jaw has the characteristic rhomboidal figure. The teeth are evidently very much worn down by attrition. This particular cranium, Blumenbach observes, recedes less from the Caucasian than the Mongolian tribe in its shape.

This cranium, which was the gift of Dr Barton of Pennsylvania, was disinterred from an Indian tumulus near Cayhoik, on the eastern bank of the Mississippi, (Nimesi-sipu,) about the 40° of north latitude. These tumuli, which were burying-places of the Indians, are dispersed all along the banks of the river, and appear to have furnished many of the sculls delineated in the present work by Dr Morton.

The only instances in which it is possible to obtain Indian sculls of the natural form, unchanged by artificial modelling, occur in the cases in which, from sickness or some similar cause in infancy, it is impracticable to apply the means of mechanical compression. The individuals situate in such circumstances, if they grow up, present heads of the natural shape of their species or variety; but it is a singular proof of the capricious and unnatural effect of prejudice, that such persons never rise to distinction in the tribe, are always regarded with contempt, and are often reduced to the rank of slaves, and as such are sold to other tribes or nations.

Among none of these tribes is the head so much deformed as it is among what are named the Flat-heads of Columbia river; and under this category appear to be comprehended not only the Chinouks, Clatsaps, Klatstonis, Cowalitsks, Kathlamets, Killemooks, and Chelakis of the lower Columbia and its vicinity, but the Klickatats, Kalapooyahs, and Multnomahs of the Wallamut river. The whole of these tribes labour with the most persevering assiduity to alter the shape of the scull in infancy, by compressing the forehead forcibly by a board and ligatures, so as to render the top of the cranium a nearly horizontal plane, while the whole head is elongated, and the occipital region is made to project remarkably. So highly is a good flattened scull prised by these savages, that their slaves are not allowed to model the heads of their children, and the distinction is reserved only for the free and noble of the tribe.

To give a view of the natural shape, Dr Morton presents in the 42d plate a Chinouk scull of the natural form, and which was the scull of a slave, obtained by Mr J. K. Townsend during a residence on the Columbia river. The figure of the cranium certainly approaches more to European ideas of beauty and symmetry than any of the others. The frontal and coronal region, though not so elevated as in the Caucasian race, is nevertheless not so much depressed as in the other specimens; the occipital region is not so prominent and elongated; the orbits even seem less separated; and the only characters peculiar to the scull are the lateral projection of the malar bones and the rhombic or rhomboidal configuration of the lower jaw. The facial angle of this scull is 76°; the longitudinal diameter 6.7 inches; its frontal diameter 4.4 inches; its parietal diameter 5.4 inches; and its internal capacity 74 cubic inches.

The contrast to this cranium is seen in those represented in Plates 43 (Chinouk chief), 44 (Klatstonis), 45 (Killemook), 46 (Clatsap), 47 Kalapooyah, and perhaps still more in 49 (Kowalitsk), in all of which the frontal and coronal regions are more or less depressed, the parietal and occipital regions are protruded, and the whole cranium is elongated.

Another class of crania delineated are those to which we have already partly alluded, from the tumuli or mounds.

These are elevations artificially raised of earth, and, as far as can be discovered, for the purpose of sepulture. In North America there are few of them east of the Allegany mountains. They begin to be common in the interior of Carolina, and abound in the great valley of the Mississippi, and, indeed, along most of its tributaries, especially upwards along the Ohio and its tributaries. To the west of the Mississippi, again, they diminish in number, and are not seen beyond the Rocky Mountains.

From these tumuli or mounds, Dr Morton gives figures of eight sculls; and from the characters presented by these he regards them as belonging to the genuine American stem. Any one might at first sight seem surprised that on this point there could be any doubt; because these tumuli are found in America, and because it is consequently difficult to perceive to what other variety of the human race they could belong. But it appears that, with the bodies or skeletons found in these tumuli are often associated articles, which have been found with the dead bodies or ashes of other nations of very different stem; and this circumstance has led some archaeological speculators to maintain that these sculls might belong to nations known to use such articles. It appears particularly that there are found in these tumuli two classes of objects, which are also found in the burying places of other nations; one, ivory beads, the other discoid stones, with or without a central aperture, the latter being of the same kind as those found among the antiquities of Scandinavia. The uses of these bodies are unknown. But, as Dr Morton agrees with those who think, that there is decided evidence to prove that America was partially occupied by the Scandinavians long before the time of Columbus, he thinks also that the presence of these discoidal stones in the American tumuli must be referred to a practice of Scandinavian origin.

The question is of no great importance. It seems more natural and not less scientific, to consider these sculls as American on the proofs of their configuration, rather than on the presence or absence of any articles of the kind now referred to. The customs of the human race are often so absurd, and regulated by circumstances so frivolous and insignificant, while they are often accidentally similar in the most remote countries, that it seems absurd, if not trifling, to consider all these minute circumstances as necessarily indicating the same people.

Dr Morton further infers that these mounds must be remains of branches of the great Toltecan family, which was spread, as has been said, from the confines of Chili to the shores of Lake Superior.

Among many American nations the custom of depositing their dead in caves, a custom both natural and of very high antiquity, seems to have been prevalent; and several sepulchral caves of this kind have been found in the Valley of the Ohio. Some years ago a cave containing many human skeletons was discovered near the town of Golconda on the Ohio river. One of these is represented in Plate lxii. In general configuration, especially on the frontal region, it approaches to the Caucasian form, but with a small facial angle and full parietal diameter. The other heads from the locality are still more similar to the Toltecan model, and leave in the mind of Dr Morton little doubt as to their origin and antiquity.

A similar cavern, containing many sculls, was discovered on the Ohio in 1835, opposite to Steubenville. These, however, Dr Morton thinks, belong to the barbarous tribes, and not to the Toltecan race.

Blumenbach, whose labours we have had occasion to mention so frequently in this article, was the first who delineated, in 1791, a genuine Charaib scull. The specimen was obtained by Sir Joseph Banks from the Island of St Vincent, in a remote corner of which only one or two families were left, the whole race having been extirpated by the negroes; and was presented by Sir Joseph to Blumenbach.

The characters of this scull are the depressed or retro-pressed forehead, and the orbits singularly open, patulous, and turned upwards, much in the manner in which they are in hydrocephalic heads; and a considerable interval between the upper margin of the lacrymal bone (*os-unguis,*) and the supra-orbital notch for the frontal nerve.

Dr Morton gives views of two Charaib sculls, one of the Charaib of Venezuela, and another from a cast of the Charaib of St Vincent. From these views, which appear to us more characteristic and distinct than the one given by Blumenbach, the same characters are manifest, and there appears, besides, a large bulging of the occipital region.

In the 70th Plate, Dr Morton gives views of four Esquimaux crania, which he arranges under the head of Mongol American. These crania partake more of the Mongol character than the American; unless we adopt the view, that the American is itself a variety of the Mongol cranium.

From all the facts recorded, Dr Morton draws the following general conclusions.

1. That the American race differs essentially from all others, not excepting the Mongolian; nor do the feeble analogies of language, and the more obvious ones of civil and religious institutions and the arts, denote any thing beyond casual or colonial communication with the Asiatic nations; and even these analogies may perhaps be accounted for, as Humboldt has suggested, in the mere coincidence arising from similar wants and impulses in nations inhabiting similar latitudes.

2. That the American nations, excepting the Polar tribes, are of one race and one species; but of two great families, which resemble each other in physical, but differ in intellectual characters.

3. That the cranial remains discovered in the mounds, from Peru to Wisconsin, belong to the same race, and probably to the Toltecan family.

Dr Morton gives the following table, indicating the comparative internal capacity of the craniums of the different varieties of the human race, ascertained from measuring the cubical contents of a considerable number of sculls of each race.

Races.	No. of Sculls.	Mean internal capacity in cubic inches.	Largest in the sexes.	Smallest in the sexes.
Caucasian,	52	87	109	75
Mongolian,	10	83	93	69
Malay,	18	81	89	64
American,	147	80	100	60
Ethiopian,	29	78	94	65

The perusal of this work is calculated to suggest some mournful reflections on the extraordinary destruction of the human species in America, since the period when that country became known to Europeans. The humane and zealous Bartholomew de Las Casas, maintained before Charles V. in 1542, that within fifty years after the discovery of Hispaniola by Columbus, the Indian race had been almost entirely swept away from the islands, and that they were hastening to extinction on the continent with the same rapid decay.[*] At a period long subsequent, viz. in 1731, Bishop Berkeley lamented the great depopulation among the American Indians in the New England States,[†] and zealously suggested various measures calculated to retard, if possible this devastation among the aboriginal inhabitants. All measures hitherto adopted, however, have been unavailing, and this havoc has proceeded at a steady and regular pace.

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[*] Remesal, Hist. de Chiapa, p. 192—199.

[†] A sermon preached before the Incorporated Society, &c. in 1731.

Of the immense number of indigenous tribes by which the two continents of America were occupied previous to and at the time of the discovery by Columbus, by far the greatest part are no longer in existence. Of the multiplied tribes which inhabited North America, whole nations have been swept away in the space of three centuries, so that not a single individual lineally descended from any of them remains. Of others but a few families or individuals continue to wring out a miserable existence between all the precarious horrors of savage life and the worst vices of the half-civilized state. These wretched remains of a powerful and populous race are compelled gradually, but steadily, to retire before the advancing tide of an adventitious population, rapidly spreading from the eastern to the western shores of America. It seems as if the vicinity, and much more the intercourse of the European, is fatal to the American race. The friendship and the enmity of the white are equally injurious to the brown man; and in the course of another half century, or perhaps much less, the American Indian will be known as a creature of history alone.

The same devastation of the original American race is perceptible in the southern division of the American continent. The once powerful and extensive empire of Peru scarcely boasts the possession of a pure Peruvian, the lineal descendant of the ancient Toltecan race. The less civilized tribes are diminishing with equal steadiness and equal rapidity. Excepting in the most remote and inaccessible parts of Brazil, and in the southern regions of Patagonia, where a few of the more powerful and courageous tribes still survive, all have sunk under the influence of European corruption, or been destroyed by the inhumanity of European tyranny. It is not possible to adduce, in the history of the world, an instance of more complete extermination than has taken place, of this once powerful and extensively diffused people.

We have only to conclude by saying, that this work is most creditable to the industry, the research, and the learning of Dr Morton. He has been singularly successful in illustrating, with great judgment, an important part of the natural history of the human race. His merit consists not only in collecting the sculls of so many tribes, for which his position as a professor in an American University gave him peculiar facilities; but in collecting, from every available and respectable source, whatever information he thought might illustrate the subject of his inquiry.

The lithographic engravings are extremely beautiful, and have every appearance of being very accurate.

ART. III.—1. *On the Glanders in the Human Subject.* By JOHN ELLIOTSON, M. D. F. R. S., &c. (Medico-Chirurgical Transactions, London, 1830, Vol. xvi. p. 171—218.)

2. *Beiträg zu den Erfahrungen über die Schädliche Einwirkung des Rotzgifts auf Menschen.* Von Dr W. ECK. *Observations on the Baneful Influence of the Poison of Glanders in Man.* By Dr W. ECK. (Medicinische Zeitung for 3d and 9th May 1837, Nos. 18 and 19.)

3. *De la Morve et du Farcin chez l'Homme.* Par M. P. RAYER, Medecin de l'Hopital de La Charité, Medecin consultant du Roi, Membre de l'Academie Royale de Medicine. *On Glanders and Farcy in Man.* By M. P. RAYER, Physician to the Hospital of La Charité, &c. &c. (Memoires de l'Academie Royale de Medecine, Paris, 1837, Vol. vi. p. 625—872.) With two coloured Engravings.

FROM the earliest records of the veterinary art, the horse has been described as subject to two diseases of a fatal character,—glanders and farcy; the first of these, indeed, being, perhaps, the most fatal disease to which that animal is liable. It was long a disputed point, whether farcy was a distinct disease, or merely a variety of glanders; but the recent pathological investigations of both veterinarians and the medical profession, may be considered as having settled that point; and the two diseases, both in their acute and chronic states, are now proved to be but modifications or varieties of each other. But though these diseases have been so prevalent in the horse and the other solidungula, it does not appear, from any records we possess, that it has been till lately observed in man. In fact, till the publication of Dr Elliotson's paper in 1830, though several undoubted cases of the disease had been previously recorded, this affection had been completely overlooked. His paper excited much interest, and was the means of directing the attention of the profession to the occurrence of a disease, which, when it occurs in man, is of the most loathsome and fatal character. Many at first derided the idea of a disease, usually regarded as peculiar to the horse and the other solidungula, being communicated to the human species; but such a body of evidence has within the last ten years been brought forwards, that it is not only impossible to deny its occurrence in man, but also to show that it is a disease by no means so rare as was at first imagined.

The French, from their characteristic thirst for novelty, as well as from their superior skill in conducting pathological investigations, have done more for the elucidation of the true nature of the disease than any other nation. The Royal Academy of Medicine took the lead in this inquiry; committees of their most distinguished members were appointed for the thorough investigation of the subject; the government, ever anxious to promote the interests of science, lent its aid, and afforded every facility; the various veterinary establishments, aided by the committee of the Academy, instituted experiments on the communicability of glanders by infection, by inoculation, &c.; and the result has been, that the nature and phenomena of the disease, its varieties, its communicability from one class of animals to another, its pathology, and its causes, are perhaps better understood than that of any other distemper to which the lower animals are subject.

The occurrence of such a loathsome and almost always fatal disease in man, was by them equally investigated, and it was found that this disease was by no means of such rare occurrence as had been at first imagined; for the very first year after the publication of Rayer's treatise, no fewer than ten cases, which had occurred in Paris, were brought before the notice of the Academy of Medicine, and published in their Bulletin for 1838, and many more have since been added to the number. The consequence of all this has been, that laws have been framed with regard to glandered and farcied horses, preventing them from being employed or exposed for sale, or even led alongst thoroughfares, and forbidding any one to sleep in the same stable in which they are kept. These laws also direct the immediate slaughter of all horses, asses, or mules, in whom glanders has advanced so far as to be regarded as incurable; and every means is by them provided to prevent the propagation of a disease so destructive to the human race.*

Four forms of the disease have been observed in the horse, viz. acute and chronic glanders, and acute and chronic farcy. The acute forms, whether glanders or farcy, usually terminate fatally in from ten or twelve days to a month; whilst the chronic forms may last for months or even years, the animal still continuing able for some work. The term glanders is usually applied to that form of the disease, one of the symptoms of which is a discharge from the nostrils of a peculiar tenacious secretion, with enlargement of the submaxillary lymphatic glands. The term farcy is commonly limited to that form in which the chief symptoms consist in enlargement of the lymphatic glands and vessels, with the formation of numerous superficial abscesses, which burst and discharge unhealthy matter. These last symptoms are, indeed, common to both forms of the disease, and very often farcy is but the first stage of glanders.

The identity of the four forms of the disease has been clearly proved both in this country and in France, by finding that animals inoculated with the matter from one form often had the disease induced in one of its other forms; for instance, the matter from chronic glanders has been found to induce both acute glanders and acute farcy, and this far more frequently than the chronic forms of the disease.

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* Annales d'Hygiene Publique, Paris, April 1840, No. 46, p. 471.

In order that the disease, which occurs in the human subject in its most fatal shape, may be the better illustrated, it is necessary to describe shortly the acute forms of the disease as they occur in the horse, together with their more remarkable and characteristic morbid appearances.

When a horse is attacked with glanders, he is observed to be languid, and often walks stiffly, as if suffering from pains in the limbs. An increased secretion of mucus from the nostrils is soon after observed, at first semifluid, jelly-like, and bearing a considerable resemblance to the white of an egg, but soon changing to a puriform, bloody-coloured, tenacious discharge, and having a very disagreeable heavy odour. There is almost always a degree of viscidity or glueiness about this discharge, which fixes the sides of the nostrils together, and is strongly characteristic of the disease. On examining the nostrils the mucous membrane is found inflamed, and covered with an eruption bearing some analogy to confluent small-pox, or with numerous ulcers, strongly resembling syphilitic sores, having thickened margins and depressed centres. These sores are at first confined to the line of the lymphatic vessels, but soon enlarge, and spread over the whole membrane, when the bones of the nose become implicated, and caries is the result. It is at this stage that the discharge becomes bloody and offensive. Pustular eruptions break out on various parts of the body; the breathing becomes laborious, and is attended with a short thick cough; the submaxillary lymphatic glands become enlarged, and swollen lymphatic cords and glands may be seen and felt in various parts of the body. The *conjunctiva* and *membrana nictitans* become inflamed, and often assume a purple hue, and discharge a puriform humour. The debility of the animal increases, the legs become œdematous, and frequently, before death, sero-sanguinolent and sero-purulent abscesses have formed in these parts. The debility, tickling cough, emaciation, &c. rapidly increase; gangrenous and ecchymosed spots appear on various parts of the body; the hair becomes dry and harsh, and falls off on the slightest touch; and the animal dies in from nine to twenty-five days from the commencement of the symptoms.

The appearances presented on dissection are, injection, reddening, thickening and ulceration of the nasal membrane; occasionally gangrenous spots here and there, and caries of the nasal bones and cartilages. The lining membranes of the larynx, trachea, and bronchii, are usually injected, thickened, and ulcerated, and covered with tough muco-purulent matter. Ecchymosed spots are frequently noticed on the surface of the lungs; and numerous hard tubercles, about the size of a nut, are dispersed through their substance. Sometimes these tubercles are hard, but friable, whitish towards their centre, but of a bright red towards their circumference; at other times they are reduced to the state of a muco-purulent deposit. The substance of the lung is very easily torn in the neighbourhood of these tubercles, and the whole lung has a swollen and injected appearance, is much softened in its texture, and when cut into often exhibits sero-purulent infiltration. The lymphatic glands, especially the submaxillary, nasal, axillary, inguinal, and bronchial, are much enlarged, indurated, and injected. Serous effusions are common in the cavities of the brain, chest, and abdomen, and collections of purulent or sero-purulent matter are commonly met with in various parts of the body. The spleen and liver are often found softened, whilst the kidneys are ulcerated, and filled with purulent matter.

Farcy, again, in the horse, generally appears in the form of small tumours on the legs, lips, face, neck, or other parts of the body, and hard cords may be seen and felt stretching between these. As the disease advances the tumours enlarge, become soft, burst, and degenerate into foul ulcers, with hard elevated edges, a depressed glassy centre, and an unhealthy purulent and bloody discharge. The horse loses its appetite, its limbs become œdematous, lameness ensues, and some degree of hectic fever comes on. In general at this period the nose begins to discharge, the animal is attacked with difficult respiration and cough, and dies with all the symptoms of glanders. Dissection usually discloses the same morbid alterations of structure noticed above as occurring in the glandered horse.

The first recorded observations of the communication of glanders to the human subject appears to have been so late as 1811, when Dr Lorin,* surgeon to the 1st Regiment of cavalry in France, published the history of two cases which occurred under his care. A veterinary surgeon in dressing a farcied horse pricked his finger. Both his hands swelled, became inflamed, and several small tumours resembling those of farcy formed on them. After trying various remedies, Dr Lorin removed them by excision, and dressed the wounds with spirits of turpentine. At the end of fifteen days the wounds were perfectly healed, and the person had no return of the complaint. The other case was precisely similar.

The first distinct description, however, of the disease as it occurs in man was given by Schilling,† military surgeon at Berlin, in 1821. An artillery-man at the veterinary school, who had the special charge of the glandered horses, and frequently washed out their nostrils, complained of rheumatic and colic pains, catarrh, and thirst. Six weeks after red streaks were observed on the checks, and a red spot on the *ala nasi*, and he felt weak, giddy, and unable to stand. By the next day the livid spot had extended over the whole nose, and fever with headach came on; and before night a livid phlyctenous vesicle had formed on the nose. The whole face rapidly swelled, was hard, of a dingy-red colour, and shining aspect. On the fourth day from the appearance of the red spot, many pustules, with hard bases and of a livid aspect, were seen on the nose and lips, and an offensive corrosive discharge ran from the nostrils. By the seventh day the discharge from the nostrils was mixed with blood, and the pustules had appeared over all the body. Nearly the whole face was gangrenous by the eighth day, on the evening of which day he died.

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* Observations sur la communication du Farcin des Chevaux aux Hommes. Journal de Medecine, Chirurg. et Pharm. Feb. 1812.

† Rust's Magazin füi die gesammte Heilkunde, for 1821, Vol. xi. p. 480.

The cellular membrane of the face was found reduced to a gelatinous yellow-coloured mass, and yellow pustular deposits were found over the pericranium, especially over the frontal bone. The muscles of the body were studded with pustular deposits of the same nature, containing a puriform lymph. The bones of the nose were exposed and carious.

In the same periodical was published the history of another case, where the disease was also caught from a glandered horse. A lad, 19 years of age, was employed in looking after a glandered horse. Whenever he cleaned out the manger he became sick, in consequence of the insupportable stench. For some weeks he complained of weariness, pains in the back and limbs, loss of appetite, &c. but at last took to his bed, and was shortly after this seen by Dr Weiss. He had mild delirium; the lining membrane of the nostrils was covered with superficial ulcerations; and a few ulcers were observed on the lips. From the mouth and nostrils issued an abundant yellow puriform discharge, and the glands beneath the jaw were swollen. The body was covered with pustules, which had healed in some few places, but formed foul ulcers in others. His respiration was hurried and laborious, and his breath was very offensive. Black fluid blood was discharged involuntarily from his bowels; and he died the day after Dr Weiss saw him.

Both of these cases were republished in Hufeland's Journal for 1822.

In the eighteenth volume of this Journal* is narrated shortly the case of a dog-feeder to a pack of hounds, who, in cutting up the carcass of a horse which had died of glanders, punctured his hand. In a few days thereafter he exhibited the usual symptoms which are met with in horses when first attacked with the disease; and at the end of a week died raving mad, with all the symptoms of acute glanders.

In the nineteenth volume of the same Journal,† two additional cases are described. A veterinary surgeon had contracted from a farcied horse, a disease attended with ulcerations in the affected arm, and what are called farcy buds (swelled lymphatic glands,) extending up the limb. Of this disease he partially recovered, but relapsed and died. The other case was observed in one of the London hospitals. A man applied with a sore on his arm, which he said was produced by a wound coming in contact with the leg of a farcied horse. With some of the matter from the wound an ass was inoculated in the leg. At first the animal's leg became diseased, being affected with all the usual symptoms recognized as belonging to farcy; but in a few days more symptoms of glanders appeared, of which the animal died, and on dissection the usual ulcerated appearances were found in the nostrils.

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* Edin. Med. and Surg. Journal for 1822, Vol. xviii. p. 321.

† Ibid. for 1823, Vol. xix. p. 155.

Dr Thomas Tarozzi[*] published in 1822, an account of a pestilential disease which broke out among a number of individuals who had visited a stable in which were confined several horses, one of which was glandered, and a few cows. Of eleven who were attacked all died but one. Violent pyrexia, pains, spasms, an eruption of boils, and the formation of a carbuncle attended the first stage of the complaint; gangrenous vesicles and symptoms of typhus characterized the later stage. No mention, however, was made of any nasal discharge, or enlargement of the lymphatics, so that it may be doubted whether the cases were really examples of glanders.

Dr Sommer,[†] the next year, republished these cases of Tarozzi's, with additional observations, but threw no new light on the subject.

Dr Seidler,[‡] in 1824, published a well-marked case of glanders which occurred in a young man who had the care of a glandered horse. Gangrenous inflammation of the nose was observed in this case, purulent discharge from the nostrils, and a pustular eruption over the face, trunk, and limbs. The body was not opened after death.

Mr Travers,[§] in his work on Constitutional Irritation, relates three cases of glanders occurring in man; as also the experiments of Coleman, Sewell, and Turner, on the propagation of that disease, by inoculating animals with the matter taken from the sores on the human body.

The first case was that of a veterinary student, who, in opening the head of a glandered horse, punctured his finger. An ulcer followed, with inflammation of the cellular membrane, and of the absorbents of the hand, attended with symptomatic fever. Abscesses then formed on the opposite arm, and in various parts of the body, as on the back, knee-joint, kidney, lungs, &c. when he became hectic and died. He had throughout no symptoms of glanders, but wholly those of farcy. Matter taken from his sores produced in asses both glanders and farcy, causing death in from twelve to fourteen days.

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[*] Annali Universali di Medicina, Aug. 1822, p. 220.

[†] Rust's Magazin für die gesammte Heilkunde for 1823, Vol. xiv. p. 487.

[‡] Ibid. 1824, Vol. xvii.

[§] Inquiry concerning the disturbed state of the Vital Functions, usually denominated Constitutional Irritation. By Benjamin Travers, F. R. S. London, 1826.

The second case occurred in a veterinary surgeon, who, in administeringa bolus to a glandered horse, allowed his thumb, on which was a slight abrasion, to come in contact with the discharge from the nostrils. An ulcer followed, and the glands in the axilla, groin, and knee-joint became affected, and sores broke out in these regions. He, however, eventually recovered.

The third case was that of a coachman, who, in wiping out the nose of a glandered horse, infected a sore which existed on his thumb. An ulcer followed, and inflamed absorbents were seen stretching up the arm. The glands in the axilla, groin, angle of the jaw, &c. became affected, and ulceration of the lining membrane of the nose with discharge took place. Superficial collections of matter formed in various parts of the body, and the integuments sloughed in several situations. He gradually recovered after a couple of years, but still remained with a broken constitution.

An ass, inoculated by Mr Sewell with the matter from this man's sores, died glandered.

Dr Grub,* in his thesis, relates also an undoubted case of glanders occurring in the human subject, also traced to communication with a glandered horse. In the same year, another thesis on the same subject, was published by Dr Krieg,† but contained no new facts.

In 1829, Dr Laurin,‡ Professor at the Veterinary School of Pavia, also noticed the circumstance of the glanders being occasionally transmitted to man, and he described the symptoms to consist in gangrenous inflammation and carbuncular tumours.

The same year Mr Brown,§ Surgeon to the 2d Dragoon Guards, published the account of a fatal case of acute glanders, caught from a glandered horse. Ecchymosed tumours appeared on various parts of the body, which burst and allowed a putrid sanies to escape. A pustular eruption also, compared to that of yaws, broke out over all the body; and acute pain was all along complained of in the limbs and trunk. A thick inspissated discharge exuded from the nostrils; low muttering delirium and somnolency existed for the last days of his life, and he died after twelve days of acute suffering.

On dissection, clusters of ulcerated tubercles were found on the lining membrane of the nose, as well as on the tonsils and pericranium, which were declared to be precisely similar to those met with in glandered horses. Clusters of gray-coloured tubercles were found scattered over all the body, and the tissues in their neighbourhood were completely disorganized, and the muscles everywhere infiltrated with a yellow serosity.

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* Dissertatio sistens casum singularem morbi contagio mallei humidi in hominem translato orti. P. A. Grub, auctore. Berolini, 1829.

† De Typho Malloide. Berolini, 1829.

‡ Trattato Systematico delle Epizootie dei piu utili Mammiferi Domestici. Per Giovanni Battista Laurin. Milan, 1829.

§ Fatal case of Acute Glanders in the Human Subject. London Medical Gazette for 1829, Vol. iv. p. 134.

Such were the facts recorded with regard to the occurrence of glanders in man, when the Essay of Dr Elliotson appeared; and, indeed, had it not been for this paper, it is impossible to say how long the disease may still have been overlooked. The cases alluded to appear to have been entirely unnoticed or forgotten; and even when a case of the disease did come under the observation of Dr Elliotson, he with great candour declares that the disease was quite new to him, and that its nature was a mystery.

Dr Elliotson described two cases, both of which he himself had witnessed, and also one which was communicated to him by Mr Parrott. In these three cases the characteristic marks of the disease were met with, viz. the discharge from the lining membrane of the nose, pustular eruptions on various parts of the face and body, and delirium preceding the fatal termination. In all the cases, too, the disease was traced to have been caused by communication with glandered horses.

In this essay Dr Elliotson published all the cases of glanders occurring in the human subject with which he was acquainted, viz. four from English works, and three from Rust's Magazin. In 1833,* he published the history of another case which he had witnessed, and in which the same symptoms occurred as in those noticed above; and, as the pathological appearances were minutely investigated in this case, not a doubt was left in his mind, that the case was really one of glanders. He also mentioned that, since the publication of his first paper on that subject, upwards of a dozen cases had been related to him by medical men, which they were now satisfied were cases of glanders. A coloured engraving, showing the appearance of the disease, illustrates this additional case.

It seems unnecessary to particularize all the other cases of glanders which have been published since the period when Dr Elliotson's paper drew the attention of the medical profession to the disease. Suffice it to state, that glanders in the human subject has been seen and described by Numan,† Alexander,‡ Hertwig,§ Brera,|| Vogeli,¶ Wolf,** Prinz,†† Berndt,‡‡ Graves,§§

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* Medico-Chirurgical Transactions for 1833, Vol. xviii. p. 201.

† Vee Artsenijkundig Magazijn. Groningen, 1830. p. 1.

‡ Archives Generales de Medecine, December 1830.

§ Gazette Medicale de Prusse, 12th November 1834.

|| Encyclographie Medicale, for 1836. Vol. v. p. 217.

¶ Journal de Medecine Veterinaire. January 1835. Vol. vi. p. 7.

** Medicinische Zeitung for 1835, Nos. 1 and 2.

†† Compte Rendu de l'Ecole Veterinaire de Dresde for 1834, p. 75.

‡‡ Lehre von den Entzündungen. Greiswald, 1836.

§§ London Medical Gazette, Vol. xix. p. 939.

Hardwick,[*] Eck,[†] Deville,[‡] Breschet,[§] Husson,[||] Roux,[¶] Andral,[**] Berard,[††] and others.

In 1837 appeared the elaborate essay of M. Rayer, which contains an account of all the cases of glanders or farcy in man which were published up to the date of its appearance. M. Rayer arranges these cases into five classes; 1. acute glanders; 2. acute farcy; 3. cases which resemble these diseases in many points, but which are doubtful in consequence of the want of sufficient details; 4. chronic glanders; 5. chronic farcy. Of these different forms we shall now give a short account.

Acute glanders may be produced in man, either by inoculation or by contagion: the first generally resulting from the diseased secretions of the horse coming in contact with a puncture or sore, and the last from breathing the vitiated air of the places where the diseased animals are kept. Such, at least, is the way in which the origin of some cases is accounted for, as no lesion could be discovered by which the diseased matter could have been introduced into the system. As in all the cases, however, the persons had either the care of glandered horses, or had come in contact with them, it is quite possible that the contagious matter was actually absorbed by the sound skin. This supposition is rendered still more probable by the fact, now well ascertained, that other diseases can be propagated by the application of matter to the unbroken surface, and that even medicinal agents may be thus introduced; and also when it is considered that it is not yet by any means ascertained that glanders can be communicated in any other way than by actual contact; indeed, the experiments instituted by the commission appointed by the French Government for this purpose seem to prove that this disease cannot be propagated by infectious effluvia.[‡‡]

In acute glanders caused by inoculation, a short period of incubation, as it were, generally elapsed between the poisoning of the wound or sore, and the appearance of the symptoms. This period was variable, sometimes being less than two days, and at others extending to eight days. After this period, pain, heat, and swelling occurred; the pain soon became lancinating, and red lines, or inflamed painful hard cords were seen extending up the limb. The lymphatic glands in the neighbourhood of the sore, and in the course of the absorbents, as in the elbow, axilla, &c. became inflamed and swollen, and diffuse inflammation of the subcutaneous cellular tissue took place, attended with smart feverish symptoms. At this period there was often an apparent amendment, the local and general symptoms partially abating in their severity; but it was only to give way to the symptoms peculiar to and characteristic of glanders.

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[*] British Annals of Medicine, February 1837.

[†] Medicinische Zeitung for 1837, Nos. 18, 19.

[‡] Bulletin de l'Academie Royale de Medecine for 1838-9, Vol. iii. p. 68.

[§] Ibid. p. 80. [||] Ibid. p. 117. [¶] Ibid. p. 256. [**] Ibid. Vol. iii. p. 116.

[††] Ibid. p. 529. [‡‡] Ibid. Vol. iv. p. 601.

When the disease was supposed to originate in infection, that is, when no local sore could be discovered, its invasion was marked in general by feverish symptoms, rigors, quick pulse, and gastric affection, or by diarrhœa and pains in the limbs.

After this period of invasion, whatever had been the cause of the disease, whether inoculation or infection, its progress was the same. Pain in the limbs, either throughout their whole extent, or confined to the region of the joints, was complained of, and was occasionally so severe as to resemble, and even be mistaken for rheumatism. Shortly afterwards circumscribed hard painful swellings were detected over different parts of the limbs and body; and the skin over these soon became of a deep red or violet colour, and occasionally the seat of gangrene. Frequently these tumours formed true abscesses, which, when opened or allowed to burst spontaneously, discharged a putrid sanies, or bloody coloured unhealthy purulent matter.

In all the cases of this disease observed in man, a constant symptom has been the presence of a nasal discharge during life, or that of an eruption or ulceration in the nasal cavities after death. The discharge was in general a yellowish viscid fluid, more or less thick, and more or less adherent to the nostrils, and sometimes presented the appearance of purulent matter mixed with blood. In some cases this discharge was very scanty, in a very few scarcely apparent. A similar discharge occasionally flowed from the mouth, and even the eyes. The nose and adjoining parts were generally swollen, and instances occurred where that organ was even gangrenous. The submaxillary lymphatic glands were rarely affected in man, but the throat and tonsils were inflamed and tumefied, and a painful feeling of constriction, with difficulty of swallowing, was often complained of. The voice generally became enfeebled, and in the later stages of the complaint was frequently entirely lost.

The respiratory function was generally disordered, the breathing was rapid, and expectoration of a peculiar aspect, resembling the nasal discharge, was occasionally met with. The breath was very fetid.

But one of the principal characters of acute glanders in man, and certainly one of the most remarkable, is the appearance of an eruption of peculiar looking pustules over the face, trunk, and limbs. This eruption has been variously compared to the pustules or vesicles in variola, varicella, vaccinia, ecthyma, boils, or the suppurating tumours of yaws; but, in fact, it differed from all these. When the pustule first made its appearance, it was found to be composed of a plastic fibrous deposit, In its further advanced stage, the fibrous laminæ of the true skin were so much separated and altered in texture, as to be no longer recognized,—an appearance which is not met with in any other pustular eruption,—and a small quantity of purulent matter was contained within it. In its last stage, a flattened crust occupied the centre of the pustule, whilst the circumference was distended with a pale-rose-coloured purulent-looking fluid. Gangrenous bullæ were frequently seen on the face or trunk, generally filled with a bloody-coloured serous fluid, whilst the cutis beneath was black, softened throughout its whole thickness, and saturated with black blood. The subcutaneous cellular tissue was much in the same state. The pustules varied in size, and continued to make their appearance during the whole stages of the disease, so that they might be seen in the same part in all their varied states. Copious perspirations generally preceded their appearance.

The state of the pulse was very variable during the different stages of the disease. It was accelerated and full during the first or febrile stage; in the advanced stage it was slow, weak, easily compressed, and sometimes intermittent; and in the last or typhoid stage, that which preceded death, it was extremely quick, and often so weak that it could scarcely be felt.

Gastric symptoms were rarely well marked in the first stage of the complaint, but vomiting was occasionally present in the advanced stage. Diarrhœa was very commonly present; the stools being numerous, fluid, occasionally bloody, and with a heavy cadaverous or putrid odour. In the later stages the teeth became encrusted, and the tongue covered with a dry brown fur, but thirst was rarely present. The abdomen was usually swelled, but not painful.

Cerebral symptoms were very common, and often severe in the later stages of the disease, sometimes even in the earlier. They have been observed so early as the second day, but more usually not till the tenth day of the disease. These cerebral affections were indicated by vertigo, sensation of extreme weakness, gloomy and desponding thought, muttering delirium, and coma.

Acute glanders in man has proved both rapid in its progress, and invariably fatal. In two-thirds of the cases published, death took place before the seventeenth day of the disease.

Though the morbid appearances have not been very minutely described in all cases, yet they have been sufficiently so to demonstrate their perfect similarity in man and the horse. The nasal cavities have not been very often examined, but where they have, they have presented the characteristic peculiarities found in the glandered horse. These consisted of ecchymosed and gangrened spots, a peculiar miliary eruption, compared to minute abscesses of the size of a grain of millet-seed, ulceration, and a deposit of granular tubercles in the sinuses. The membrane itself was usually thickened, infiltrated, and studded with numerous granular tubercles, and covered with a thick tenacious puriform discharge. The bones of the nose were occasionally found corroded.

The larynx and trachea have occasionally exhibited marks of disease, such as softening, general injection, and lividity of the mucous membrane; and occasionally a peculiar confluent pustular eruption, and a glutinous mucous secretion.

The lungs usually exhibited those morbid appearances met with in lobular pneumonia; that is, they were much injected, and were filled throughout with an innumerable quantity of brownish or whitish tubercles, between the intervals of which the lungs still crepitated on pressure; sometimes, however, they were indurated, and did not crepitate, and on a section being made, purulent sanies could be squeezed out, showing the presence of purulent infiltration. The tubercles varied in size from a hemp-seed to that of a nut. Small abscesses were occasionally met with in the substance of the lungs. These morbid appearances in the lungs have been observed in all the cases published since the appearance of M. Rayer's work.

Ecchymosed spots have been noticed on the surface of the heart, liver, stomach, and alimentary canal; and the same has been observed with regard to the intestinal mucous membrane. Abscesses have been observed in the substance of the liver.

The lymphatic ganglia were usually enlarged, often presenting a red and injected appearance, or they were of a brown colour, soft, and friable. Those chiefly affected were under the jaw, along the neck, in the axilla, elbow joint, and groin. The bronchial lymphatic glands were also very commonly affected.

The cellular tissue was always much diseased, being gangrenous in some places, and very generally infiltrated with turbid serous fluid. Here and there small collections of purulent matter had taken place.

From the above statement it will be seen, that acute glanders in man is to be distinguished from all other diseases by the following symptoms. During life by the eruption, ulceration, and discharge from the nostrils; the peculiar cutaneous pustular eruption, and general formation of abscesses over the body; and after death by the presence of ulceration and tubercles in the nasal cavities; ecchymoses and tubercles in the lungs, and pustular eruption on the mucous membrane of the larynx. In no known disease but glanders are such appearances met with, and if they be attended to, it is impossible to confound it with any other. These symptoms and morbid alterations of structure are precisely those which are met with in the horse which has died glandered.

With regard to the treatment to be pursued in this form of the complaint, nothing satisfactory can be stated. The disease has invariably proved fatal after it has once developed itself. But if assistance were early sought for, whilst the symptoms were still local, perhaps the disease might be arrested by excising and cauterizing the sore or puncture supposed to be infected, and extirpating any gland which had become enlarged.

Acute farcy only differs from acute glanders in the absence of the nasal affection. The other symptoms are precisely similar to those described as belonging to acute glanders. The cases of glanders are, in fact, during their first stage, cases of farcy; it is only in their later stage that they assume the characteristic symptoms of glanders. Acute farcy has been several times observed in man, but the mere fact of nasal discharge not having been noticed by the narrators of the cases, is no proof that it did not exist. The nasal cavities were only once examined after death, and in that case, the characteristic appearances met with in glanders were observed. From the imperfect mode in which the cases are narrated, it is therefore impossible to arrive at any certain conclusion as to the comparative frequency of the one or other form of the disease in man.

The chief symptoms, then, of acute farcy in man are the local inflammation, and swelling of the lymphatic glands and vessels, and finally, of the whole limb. Numerous small tumours extend in lines along the limbs, and terminate in suppuration or gangrene, whilst the inflamed cord-like lymphatic vessels are seen extending from one to the other. Abscesses form over the surface of the body and limbs; gangrenous patches occur here and there; and there is frequently attendant inflammation of the superficial veins. In every case, the peculiar pustular eruption, so characteristic in glanders, is observed.

The pathological appearances correspond perfectly with those seen in glanders; the same pneumonic tubercles and abscesses, the same alterations in the glandular structures and cellular tissue; and even in the only case where the nasal cavities were examined, the same tubercular alterations were observed. Abscesses have been met with in the substance of the brain, and lymphatic and serous exudation has been seen on the surface of the arachnoid membrane.

Acute farcy might, from want of attention, be confounded with the common accidents resulting from punctures received in the dissection of putrid animal bodies, but may at once be distinguished by the numerous abscesses which form, and not only in the limb with the poisoned wound, but also over different parts of the body and limbs, and especially by the peculiar cutaneous pustular eruption which is invariably present, and which is never observed in any of the maladies caused by puncture, and the introduction of merely putrid matters into the system.

It seems unnecessary to do more than allude to those cases which Rayer has arranged under his third class; cases which in many of their symptoms bear a considerable analogy to glanders or farcy, but which, from the imperfect mode in which they have been described, or the want of the specific eruption, could not be classed under either of the preceding heads. Such are the cases mentioned above as described by Tarozzi, and some cases of poisoned wounds received in the dissection of dead or putrid bodies, where abscesses formed in various distant parts of the body; as also some cases resembling the carbuncular disease lately epidemic amongst cattle.

Chronic glanders is known in the horse by the discharge from one nostril of a thick yellowish-coloured matter, and by enlargement of the submaxillary glands; the animal usually presenting the appearance of health, and being fit for work. This disease is, however, occasionally preceded by farcy, or enlarged rows of small tumours on the legs, and it is this form which it generally assumes in man. The horse is generally killed before the disease has run its whole course, or is cut off by an acute attack supervening.

The morbid appearances are chiefly met with in the nasal mucous membrane. Little, white, flat tubercles about the size of a pin's head, with their centres whiter and more elevated, and their bases insensibly losing themselves in the mucous membrane, are found scattered over that membrane. These contain neither purulent nor tubercular matter, and when cut into, it is impossible to recognize any distinct line, marking the separation of the thickened from the sound membrane. The thickened portion, however, is of a duller white colour, but shades insensibly into the natural colour of the pituitary membrane. These tumours appear to be formed entirely at the expense of the mucous layer, as the fibrous portion is found forming a layer at the base of each, unaltered in texture. These tumours, though very frequently single, are often grouped together, so as to form small mammillated patches. Later in the disease, this form is more evident, as the mucous membrane is then found covered with oval elevated patches, of a whitish-yellow colour, and smooth on the surface, if they are not ulcerated. Even at this stage no adventitious deposit can be detected in the thickened patches; they appear to consist of the mucous nasal membrane simply thickened. Amongst these small miliary tumours and oval patches, are found small indurated tumours, and patches bearing a strong resemblance to cicatrices.

As the disease advances, these tumours and patches undergo softening, though without any evident formation of purulent matter. This softened portion, together with the thick adhesive mucus which covers it, can be easily washed off by pouring water on it. The part thus exposed exhibits an ulcer with an elevated edge and depressed centre, which, as the disease advances, extends and coalesces with those in its neighbourhood. However irregular in form these ulcerated surfaces may be, they are always surrounded with a thickened elevated margin ; but so long as the disease remains chronic, no redness is observed around them, nor do they extend through the fibrous layer of the pituitary membrane ; but if the animal has suffered an acute or subacute attack at any subsequent period to the formation of these ulcers, they are found to have penetrated through the fibrous layer, and to have attacked both the cartilages and bones of the nose.

When the disease has lasted long, the bones of the nose become much altered in texture. Sometimes they are thickened, very porous, of a white colour, very brittle, and easily crumble between the fingers. At other times, the osseous laminæ acquire increased hardness, and a thickness four times greater than usual, with sharp margins, rugous unequal surface, and many apertures, as if for the transmission of vessels. The ulcerations often destroy the septum so as to lay the two nostrils into one.

Numerous ulcerations are also met with in the larynx, and on the internal surface of the epiglottis; occasionally, too, they extend to the larynx, and the character of the ulceration is precisely the same as that in the nasal cavities.

The lungs are usually filled with scattered granules of a globular form, hard, and of the size of a pin's head, which, when cut into, allow a small white solid grain to escape, which had evidently been enclosed in a kind of sac, with cartilaginous walls. These granules are rarely collected together in such numbers as to prevent the lung from crepitating when squeezed. Tubercular deposits have not been met with. The consequences of lobular pneumonia are frequently observed. Small, reddish, solid and hard masses, from the size of a nut to that of an olive, are often met with scattered over the lungs, but they contain neither purulent nor tubercular matter. Other kinds of tumours are also occasionally met with in the lungs, evidently the result of inflammatory action. Some of these present the appearance, and have the consistence of recently deposited fibrine, are semitransparent, and present on their cut surface, yellowish points ; others are hard and of a cartilaginous structure externally, whilst within they contained a small quantity of thick fluid resembling purulent matter. The interbronchial glands are often enlarged and filled with a yellowish-coloured solid matter, which easily crumbles between the fingers.

The lymphatic submaxillary ganglia are always enlarged, on one side only when one nostril is affected, on both sides when the two nostrils are diseased. Their agglomeration forms tumours varying in size from a pigeon's egg to that of a goose. Their tissue is more indurated and whiter than is natural, and they are often infiltrated with a yellowish-white tubercular matter. A distinct chain of these glands can always be traced from the lower portion of the pharynx to the posterior portion of the nostrils.

Enlargement of the lymphatic glands and ganglia of the extremities are often met with, as well as fibrinous concretions in the veins. Infiltration of serous fluid, subcutaneous abscesses, and ulcerations in different parts of the skin are frequent; in fact, the appearances usually met with in that form called chronic farcy.

From this it will be seen that chronic glanders in the horse has no connection whatever with pulmonary consumption, as it takes place in the human subject.

In man, chronic glanders has been but seldom observed. In the cases which have occurred the disease was caught from glandered or farcied horses, and was always preceded with symptoms of chronic farcy; that is to say, with swelling of the lymphatic vessels and ganglia, which lasted for many months before the nasal discharge made its appearance. Pain and swelling of the joints and limbs, enlargement of the lymphatic vessels and glands situate under the jaw and in the groin, an eruption of red spots over the limbs, numerous subcutaneous abscesses, pain in the throat and nose, and later in the disease a thick tenacious discharge from the nostrils, were the usual symptoms of the complaint.

The morbid appearances of chronic glanders in man corresponded with those described above, as occurring in the horse, as much at least as to show that the diseases were the same. The nasal cavities in these cases were only very superficially examined, but it was remarked that the ulcerations presented the same characters as those in the horse. Ulcerations were also observed on the trachea, larynx, and epiglottis. Small abscesses were seen scattered through the substance of the lungs, as well as small spots here and there, bearing a resemblance to those produced by pulmonary apoplexy. Purulent infiltration and circumscribed yellowish coloured deposits have also been met with. The appearance of the enlarged glands and lymphatic vessels has not been described.

With regard to the treatment of this form of the disease, little is known. Preparations of mercury and of iodine, together with vegetable decoctions, &c. have been administered internally. Dr Elliotson says he has in two cases found considerable success from using a diluted solution of creosote, and that at the time his paper on creosote was published, they were still well.

Chronic farcy has also been occasionally observed in the human subject. All the cases yet recorded have occurred in the persons of individuals belonging to veterinary establishments, and could be traced to pricks received in dissecting animals which had died of glanders or farcy. In several, the symptoms during life bore a strong resemblance to those produced by pricks received in the dissection of putrid bodies. Shortly after the prick was received the wound inflamed, and both phlegmonous and erysipelatous inflammation attacked the limb, and progressively extended up to the axilla. Red lines and hard cords, evidently inflamed, lymphatic vessels extended up the limb, and the glands in their course enlarged. Subcutaneous abscesses formed in many parts of the limb, and after many months of suffering, the most of the cases recovered. In a few of the cases abscesses formed in different and distant parts of the body, articular pains resembling the rheumatic were complained of, and severe constitutional disturbance was experienced. The progress of the complaint in all the cases was very slow.

From this it will be seen that chronic farcy in man bears a striking resemblance to the inflammatory consequences of punctures received in opening putrid bodies. It differs chiefly in the more tedious and longer duration of the disease, in the special affection of the lymphatic vessels and glands, in the formation of abscesses far from the seat of the puncture, in always originating in a specific cause, and occurring only in those persons who are connected with veterinary establishments, or have had communication with living or dead glandered or farcied horses.

After the details given above, it is quite unnecessary to quote the details of any particular case. For these we must refer to the works enumerated in the short historical sketch.

The fearful fatality of acute glanders and farcy when occurring in the human subject loudly calls for a thorough investigation of the true nature of the disease, in order that some means may be suggested, calculated to arrest its virulence or stop its progress. With the single exception of what Dr Elliotson has stated with regard to the beneficial results of a dilute solution of creosote in the chronic form of glanders, no remedy appears to have had any effect in arresting the progress of the disease.

Professor Rossi[*] of Turin, with the view of ascertaining the true nature of the disease, instituted a number of curious experiments which led him to conclude, that the poisonous effects of glanderous matter was owing to the presence of prussic acid, and, in fact, that glanders was nothing else than poisoning with that substance. When the matter of glanders was acted on by the galvanic pile, he found that a quantity of gas was extricated, which proved to be cyanogen. A very offensive, intolerable odour at the same time filled the apartment in which the experiment was conducted, and so affected the operator as to produce vertigo and such a sensation of weakness, that his knees bent under him, and he fell to the ground. This Professor Rossi attributed to the presence of prussic acid. Regarding the disease of glanders, therefore, as simple poisoning by prussic acid, he says he has been successful in neutralizing its effects in dogs, by making them inhale oxygenated nitrous acid gas, or chlorine.

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[*] Analisi della Materia Purulenta proveniente dalle cavità nasali di Cavalli affetti da Morva; con esperienze di questa malattia nei Cani. Del Sig. Francesco Rossi, Presido del Collegio Chirurgico del Torino. Torino, 1838.

It is impossible to agree with the conclusions at which the learned professor has arrived. Cyanogen may be eliminated by means of a strong galvanic power, from many animal secretions, without its being necessary to suppose that the peculiar properties of these secretions depended on the presence of prussic acid. It is far more likely that the poisonous matter is, as in all other cases, an imponderable body of a peculiar nature; and it is quite possible that it was this substance which was the cause of the insupportable odour in the apartment, and produced the peculiar effects observed on the operator.

ART. IV.—*De Iritide, Commentatio ab Illustrissima Societate Medico Practica quæ Lutetiae Parisiorum floret, in altero certamine die xxvii. M. Septembris, anni* 1836. *Praemio Aureo publice ornata.* Scripsit FRIDERICUS AUGUSTUS AB AMMON, Med. D., &c. Accedunt in Tabb. Aen. ii. Figg. Pictæ xviii. Lipsiæ, 1838, 4to, pp. 48. *Prize Essay on Iritis.* By FREDERIC AUGUSTUS VON AMMON of Dresden, &c. Leipsic, 1838.

Dr VON AMMON has been for many years distinguished as an able ophthalmologist, and, besides the practice of the profession of oculist, is known as the editor of a journal of ophthalmology, and the author of several able essays on various subjects connected with the anatomy, physiology, and diseases of the eye.

In the year 1834, the Paris Medico-Practical Society proposed as the subject of their prize essay for 1835, the following question; To describe the nature and symptoms of Iritis; to establish the different species of the Disease; and to explain the method of treatment. The essays were to be written in Latin or French, in conformity with the usual rules, and transmitted to M. Alpheus

Cazenave, General Secretary to the Society, before the 1st of May 1835. The present essay, which was received in proper time by the judges, was referred by them to another competition, which was appointed for the year 1836; and in this competition it obtained the prize.

Though the essay received from the commendation of the judges, very unequivocal proofs of its merit, the author after receiving it, conceived it to be his duty to revise it carefully, and add, retrench, modify, or rectify, as the subsequent experience of two complete years suggested; and the monograph, accordingly, appears with all those improvements which such revision may be expected to insure.

It was further the wish of the author, that the society should have caused all the figures and delineations with which the essay was accompanied, to have been engraved and published; but this the society declined to do. The author was therefore under the necessity of preparing and publishing these at his own expense; and he has, on this account, been compelled to restrict their number to eighteen. Those who wish a greater variety and extent of illustration, he refers to his Clinical Illustrations of the Diseases and Malformations of the Eyes, Eyelids, and Lacrymal Organs, published in folio at Berlin, in 1838 and 1839.* Dr Ammon divides his essay into six chapters; the first devoted to the anatomy and physiology of the iris; the second to the nature, symptoms, and cure of iritis in general; the third to the subject of traumatic iritis and its different forms; the fourth to the subject of serous *iritis* and its different species; the fifth to parenchymatous iritis and its various forms; and the sixth to posterior serous iritis or inflammation of the uvea and its effects.

The iris Dr Ammon justly represents to consist of two thin membranes, an anterior and a posterior, containing between them a celluloso-vascular web, which he terms the proper tissue of the iris, (*tela iridis propria.*) This celluloso-vascular web, he observes, is thin and soft at its external or large circumference, and forming in some parts of the anterior surface, rugæ or folds, various in size, extends to the small or pupillar margin, which is formed by its condensation in a circular form. The orbicular fibres, which many anatomists represent to be found there, Dr Ammon has never observed. The iris, therefore, he concludes, is composed of numerous vessels, nerves, and contractile cellular tissue, forming the continuous circle in the region of the pupil. When this cellular tissue is examined by the microscope, it appears on the pupillar margin abundant, and as if puckered, and the middle substance is thinner than in the ciliary margin.

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* Klinische Darstellungen der Krankheiten und Bildungsfehler des Menschlichen Auges, der Angenlider und der Thranenwerkzeuge nach eigenen Untersuchungen, Theil i., Berlin, 1838; Theil ii. Berlin, 1839, in folio.

Dr Ammon agrees with those who regard the vascular structure of the iris as of the erectile nature, and who ascribe the motions of the organ consequently chiefly, if not solely, to changes in the state of its vascular system. The ciliary arteries, he observes, which form the great and small circles of the iris, are peculiar in their structure, and present a great resemblance to the capillary vessels of the muscles both in external form and course, and in function, which consists in the alternate changes of very rapid expansion and contraction.

The anterior and posterior membranes of this curtain are of the nature of the serous membranes, possessing the same physiological properties, and liable to the same morbid actions. The anterior membrane, or that which forms the membrane of the aqueous humour, appears, when carefully examined, to be villous or velvet-like in structure; a peculiarity which is derived from the presence of minute *villi* or piles on the anterior surface of the membrane, and the very tender vessels of the iris. Its continuity with the membrane lining the cornea is demonstrated in the eye of the fœtus and new-born infant; and the only difference is, that the latter is perfectly translucent, and very smooth, while the anterior membrane of the iris is villous and less translucent. This membrane never passes into the posterior chamber of the eye. This anterior membrane is chiefly arterial. The posterior membrane of the iris, which has been long distinguished by the name of *uvea*, is, on the contrary, mostly venous in structure, and secretes the *pigmentum nigrum*.

The iris is as it were enchased or set into the inner margin of the cornea and sclerotic membrane by the ciliary circle or ciliary margin. This part, the minute structure of which Dr Ammon described particularly in the year 1830, and which he named the *orbiculus capsulo-ciliaris*,[*] is very important in a pathological point of view.

One circumstance in the anatomy of the organ, very important in explaining some of its inflammatory conditions, we are surprised Dr V. Ammon does not notice. The iris is doubtless enchased into the cornea and sclerotic membranes of the eye; but its connection with the latter is at once closer and firmer than it is with the former. The ciliary margin of the iris is most extensively connected to the sclerotic coat, and the numerous vessels with which the former is supplied are intimately connected with the latter. Though the sclerotic coat also is itself a colourless membrane, and therefore naturally not very vascular, yet it is liable to become very vascular, and its vascularity is then very difficult to be removed. In many cases of iritis, especially when originating in syphilitic or mercurial poisoning, the sclerotic is affected before the iris, and the inflammation extends from the former to the latter; and conversely, when the iris itself is inflamed, it invariably causes considerable affection of the sclerotic, partly directly, partly through the medium of the *orbiculus capsulo-ciliaris*, described by Dr V. Ammon. This, indeed, is one of the circumstances which renders iritis so difficult to be speedily and completely cured, and so liable to recur.

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[*] Der *Orbiculus Capsulo-ciliaris* eine Verbindung welche in menschlichen auge zwischen der hintern Flache der Ciliar-fortsatze und der vordern Linsen Kapsel wand besteht Vom Herausgeber. Zeitschrift fur die Ophthalmologie von *Prof.* Dr F. A. V. Ammon, Dresden, 1830.

Iritis, Dr V. Ammon regards as a disease of the greatest importance, and indeed the cardinal point, as it were, of ophthalmic pathology; for as the iris is situate in the middle of the eyeball, and has an intimate communication with the most important parts of the organ, so the doctrine concerning iritis occupies the central point, as it were, of the whole ophthalmiatric art.

Iritis may be induced by two orders of causes, either internal or external. The latter are such circumstances as wounds or blows on the eyeball. The former consist of those deranged states of the system which are known in this country by the general name of ill health, bad habit, or cachectic conditions, and are designated in the German schools, where the humoral pathology is not and never had been altogether extinct, under the convenient abstract term of *Dyscrasia*, that is, a bad or morbid mixture of the fluids, and which may be represented in English by the analogous term of Distemperature. Whether the hypothetical assumption of *dyscrasia* or distemperature will always account for the occurrence of such diseases as iritis, is not in every case easy to say; nor is it more easy to define this distemperature, or specify the marks by which its presence may be inferred. But it may be sufficient to observe, that there are in general indications of a disposition to inflammation in various textures, more especially chronic; and probably this disposition is induced by the united operation of some morbid poison and cold on the system. Dr Ammon specifies as instances of the *dyscrasia* or distemperature, a depraved constitution of the blood arising after fevers, and acrimony of the fluids depending upon the syphilitic poison, scrofula, the variolous poison, itch, gout, or rheumatism. These forms of distemperature rarely produce iritis spontaneously, he adds; and it requires the concurrent operation of other causes, as exposure to solar heat or the heat of overheated apartments, wind, smoke, dust, the use of wine, seasons of the year, hard labour, and especially exertion of the eyes, all of which easily excite the disease in cachectic subjects.

We are suprised that in this enumeration the author does not mention as a cause of iritis, a state of the system which is by far the most frequently observed in this country to be favourable to the production of the disease. The great majority of cases of iritis take place in the persons of those whose systems have been more or less impregnated with mercury, in some instances to a very large amount. The charging of the system with this mineral is then the distemperature or *dyscrasia* which disposes to the disease; and in general so strong is the disposition thus induced, that a very slight exciting cause, as exposure to cold, or a little too much use of the eyes, is quite sufficient to induce the disease. We are aware that it is the custom to ascribe cases of iritis taking place under such circumstances, to the operation of the syphilitic poison, uncontrolled, and not expelled from the system, and that the appearance of the symptoms of iritis is then regarded as the signal for the renewed exhibition of mercury. But, independent of the fact that it is very doubtful, and assuredly not ascertained, that the syphilitic poison even by itself produces iritis, it is a fact which can be shown to repose on the foundation of numerical results, that iritis is infinitely more common after the use of mercury, than after any other of the causes already specified.

We must here take the liberty of noticing and rectifying another fallacy in this matter. Iritis is said by almost all authors, and Dr Ammon is among the number, to follow rheumatism or the rheumatic *dyscrasia*. Now, though we do not say that iritis never accompanies rheumatism, or even that it rarely accompanies, or follows that disorder, we must state it as the result of observation somewhat extended, that the disorder termed rheumatism, which it usually and most commonly accompanies, is not genuine rheumatism, but periosteal inflammation, which, from its site, and from the circumstance of the pains being most intense during the night, is always regarded as chronic rheumatism. If, however, in such cases, the affected parts be examined, it is found that the periosteum is thickened, rough, irregular, and generally very painful. These periosteal inflammations are very generally excited and maintained by mercury; and the great disposing cause both to these and also to the iritic attacks, is doubtless, according to what we have observed, the phlogistic state of the system, and its extreme susceptibility to the detrimental operation of cold, induced by the operation of mercury.

Dr Ammon is at a loss to determine whether the acute cutaneous disorders have any influence on the production of iritis; and he observes, that, as the acute exanthemata most commonly attack the skin and mucous membranes from the commencement, and seldom affect the serous membranes towards the close of the disease, he thinks that these disorders should not be regarded as mere affections of the skin, but as inflammatory or sympathetic irritations. He allows that this is less applicable to the serous membranes, and especially to that of the iris; for if towards the close of typhous fever, small-pox, scarlatina, or measles, this membrane is affected, this affection terminates either in albuminous or in puriform exudation, and not, as in exanthematous diseases, in desquamation It is a matter of fact that iritis takes place after typhous fever, after small-pox, after scarlet fever, and after measles. These attacks of iritis, however, he argues, occurring at the close of such diseases, are to be regarded as metastatic, if by metastasis be meant the migration of a disease from one organ to another, while the primary disorder subsides on the migration. But inflammation of the iris also, he thinks, is truly dyscratic, that is, depending on distemperature; because it takes place in the system after its fluids have been depraved by fever or other disorders.

To these views we feel it impossible altogether to assent; and we think that English physicians and oculists will not be astonished that we do not. We are much inclined to call in doubt the fact of metastasis in cases of the kind mentioned by the author, and to consider the whole of them as the natural effect of the unresisted or aggravated course of the disease.

The iritis which is observed to follow typhous fever is not so much mere inflammation of the iris, as a part of inflammation of the eyeball at large, and especially the sclerotic coat, or of the cornea, or of the choroid coat. It is most usually observed to follow or accompany one or other of these affections, and is never observed to take place by itself, unless in persons who have been under mercurial influence at the time at which the febrile disorder was developed, or after it had subsided.

The variolous iritis comes on in a mode a little different. Almost invariably it is the result of one or two variolous pustules on the cornea, giving rise to inflammation and ulceration of the entire thickness of that membrane. In this state the inflammatory action extends through the cornea, and if near the insertion of the large or outer major of the iris, it gives rise to inflammation in the latter membrane. In other instances it causes inflammation of the iris merely by the extension of the morbid action to the membrane of the aqueous humour. In a third class of cases, the variolous pustule proceeding to ulceration, the cornea is perforated, the aqueous humour escapes, the air is admitted; the iris, either with or without being pushed to the aperture in the cornea, becomes the seat of inflammation; and the whole eyeball is involved in the same destroying process, which terminates in general confusion of all its textures, in staphyloma and atrophy of the ball.

Of the iritis which succeeds scarlet fever we are happy to say that we have little or no experience.

The iritic inflammation which takes place after measles is not very different from that which follows small-pox. The morbillous or rubeolous action always affects the ophthalmic mucous membrane; and if the inflammation be intense or considerable, it passes to the cornea and the sclerotic coat, and thence to the iris. It may happen that this ophthalmic inflammation may be confined to the ophthalmic mucous membrane; it may happen that it may subside in the general disorder, and, above all, the disorder of the facial and bronchial mucous membrane subsides; it may happen that, after continuing for a few days in the congestive and irritative state, it may subside without having so materially distended the vessels that they easily empty themselves, and without giving rise to any chronic inflammation or any inflammatory product. But we know that the rubeolous inflammation does leave both the palpebral and the ocular mucous membrane in a state of chronic inflammation, exactly as it leaves the bronchial and pulmonic vesicular membrane in that state; and it cannot be wonderful if this inflammation should pass to the cornea or the sclerotic coat, and thus affect the iris. In all this we perceive nothing like metastasis. We recognize only the extension of inflammatory action from one texture to another, and the natural persistence of inflammation, or its lingering in various textures, if it have not been moderated or subdued by the prompt and seasonable employment of remedies.

The gouty or arthritic iritis is the only one which can be said to be indicative of a generally disordered state of the system. But that general disorder, it must be observed, is part of the general state of distension and plethora of the vascular system, and is both created and aggravated by full living and the abdominal plethora to which persons who indulge in the pleasures of the table are liable. It may be doubted whether there is any other *dyscrasia* than this; and it is a clear proof of the nature of this *dyscrasia*, that the disease is always moderated and abated, and sometimes wholly removed by diminishing the fulness of living, and restraining the diet. "Iritis," says the present author, "is not unfrequently the last link in a long chain of many evil symptoms; especially among the gouty advanced in age; among the strumous, and those who are affected with inveterate syphilis; and the same takes place in those in whom the abdominal viscera are obstructed, or in whom the portal vein is the source of disorder."

In this class of persons, we would observe, the affection of the sclerotic coat previous to, or along with, that of the iris is conspicuous. Not only does the iris display the change in colour indicative of inflammation in the case of light and contracted pupil; but round the cornea is seen the deep pink-coloured ring, which indicates the chronic inflammation of the sclerotic coat, while the patient feels the soreness, fulness, and painful tension all round the eyeball.

Inflammation of the iris may either arise in, and be confined to the iris itself, or it may arise like inflammation in other textures of the eye, and hence pass to the iris, or it may pass from the iris to the other textures. In the first case it is primary or idiopathic; in the second, it is secondary or symptomatic; and in the third, it is complicated. Inflammation may also attack the whole or part of the iris, or may affect the membrane previously sound, or more or less diseased. This gives rise to the distinction into universal or partial, simple or complicated. Again, the disease may be seated in the anterior surface, in the posterior surface, or in the substance of the membrane. The two former constitute different forms of serous iritic inflammation; the latter is the parenchymatous iritic inflammation. Lastly, all these different forms may be united.

Dr Ammon further thinks that iritis may be distinguished into several stages, three at least; the first that of congestion or inflammatory irritation of the iris; the second, true inflammation; the third, more violent inflammation; and as to rapidity of course he makes it to be either acute or chronic. It is also when it has once taken place, very liable to recur; and it is then very likely to destroy the membrane or even the eye. When it takes place in those blind of one eye, it is much more likely to prove pernicious and destroy the organ, than where the other is sound, or where both are previously sound.

The symptoms of iritis are arranged by the author in two classes; the objective symptoms, and the subjective symptoms.

The objective symptoms are those which are distinguished by surgeons as the sensible signs. They consist in the change of colour in the iris, changes in its brilliancy and position, changes in the state of the aqueous humour, morbid exudations on the anterior or the posterior surface of the membrane and in its substance, changes in the state of the pupil and in the motions of the iris, swelling in the venous circle, a peculiar sort of redness in the conjunctiva, and a greater or less degree of blepharitis, that is, inflammation of the palpebræ. Though these may be mentioned as the pathognomonic objective symptoms of iritis, yet they might be greatly increased in number, if those symptoms are regarded which attend complicated iritis, that is, if along with the iris, the ciliary circle, the ciliary processes, the capsule of the lens, and the *corona ciliaris*, or if the choroid coat, retina, sclerotic coat, or cornea be attacked with inflammation.

The subjective symptoms of iritis consist of those dynamic changes or disorders in the functions of the eye which attend or follow iritis, viz. intolerance of light, pain in the iris, and various changes in vision.

Dr Von Ammon then considers these symptoms separately and in detail; and we shall notice those which are most important.

One of the most characteristic symptoms is change in the colour of the iris. The natural colour is always more or less changed; for instance a bluish iris assumes in the inflammatory state a greenish colour, and the deep-seated colour becomes reddish. Besides these changes in colour, which also loses its lustre, the natural brilliancy of the membrane is impaired or disappears, and the characteristic structure of the membrane, as connected with its brilliancy, is disturbed or altogether destroyed. These changes, which are easily recognized by comparing the sound with the inflamed eye, begin at the pupillary margin of the iris, and pass gradually to its ciliary margin. These changes in colour and brilliancy are ascribed to the unusual accumulation of blood in the vessels and parenchyma of the iris, and the change in the state of the blood itself, whence the secretion of that matter to which the iris owes its clearness, its colour, and its brilliancy, is either diminished or entirely changed. It is allowed, that the individual globules of this fluid change both their shape and colour in inflamed parts.

Besides the change in colour, the site of the iris is also changed. It loses its funnel-like shape at the recess of the pupil, and advances nearer the posterior wall of the cornea. This change is also caused by the excessive accumulation of blood in the vessels of the membrane, causing it to be distended and swelled, and accordingly, as it cannot easily swell backwards, it does so in the forward direction. This shows that it is not so much the iris that changes its position as the distended parenchyma of that membrane, by which its central portion is protruded forward. This must be distinguished from strabismus, which the protruded iris often simulates.

In the first stage of iritis the aqueous humour becomes muddy, —a change which depends on the derangement in the secretive function of its membrane. It is also not unfrequently more copious than natural.

The pigment or colouring matter of the iris is changed in inflammation; for it is secreted sparingly, abundantly, or morbidly. If the quantity secreted be less than natural, paleness in the colour ensues, and great derangement in vision. If the quantity of pigment is increased, in general the colours become brown and indistinct; the shape and aspect of the iris also may be so changed that protuberances are formed in it various in colour and shape. Lastly, if the pigment itself be changed, the colour of the iris is also changed or destroyed. (*Iridallochrosis.*) The author has observed so large a quantity of yellow pigment in the middle of the circle of the iris, that the latter being elevated assumed a stellated arrangement, which seemed as it were a crown placed on the pupil. He has also often observed, especially in chestnut coloured eyes, so large a secretion of pigment over the whole web of the iris, that its anterior surface appeared sprinkled with a large quantity of brilliant powder.

The morbid secretions furnished by the inflamed iris consist either of a jelly-like mass, or albumen, or puriform fluid, or blood.

The exudation of lymph, which is at first fluid and jelly-like, is always fraught with danger to the eye, in so far as it very often produces adhesions, destroys the mobility of the iris, fills up the pupil, and consequently destroys vision. Dr V. Ammon distinguishes two forms of lymphy exudation, one jelly-like and semifluid, not necessarily causing adhesion, indeed, rarely causing adhesion, and the other plastic lymph, or that which does cause adhesion. It is almost needless, however, to say, that these two are mere varieties of the same morbid effusion.

The forms in which these exudations may be deposited are too various to be enumerated in this place. It is sufficient to say, that they may cause every variety of irregular pupil;—the circular, the oval, the double-elliptical segment, like the pupil of the cat, the triangular, the quadrilateral, the trapezoidal, and the irregular polygonal. When they connect the pupil to the lens, the effect of these adhesions is to form various species of *synechia* or closure of the pupil. Even short of all this mischief, inflammation may render the inner margin of the iris thick and puckered, and incapable of motion; and very often this result is accomplished without the effusion of much lymph, or with the effusion of a small quantity into the interstitial cells of the membrane.

The secretion of lymph on the *uvea* or posterior surface of the iris always almost constitutes posterior *synechia*, either partial or total, according to the quantity of lymph effused, either in separate filaments, or in large quantity. The former state is known by dilating the pupil artificially, when the form is regular; the latter, by the immobility of the thickened iris and the subsequent occurrence of cataract. In some instances, the exudation extends towards the ciliary processes and the choroid coat, filling the pupil with a new morbid mass.

The exudation of lymph into the substance of the iris, which has been already partially noticed, gives rise to great changes in the aspect, colour, and shape of that membrane. Its living, movable, and erectile aspect disappears, and it seems like a hard, dead, membrane in the eye. Its colours, also, are greatly changed,—yellow-whitish and black mixed, or reddish and brown. The surface of such an iris always appears thickened and irregular. It is still more irregular, when, as ofttimes happens, the lymph has assumed the form of drops or little tubercles. This state of the iris Dr Ammon at one time denominated *Iridoncosis (tumescentia iridis)*; but he now calls it, *Iridauxesis (ampliatio vel incrementum iridis;)* reserving the former name to designate abscess of the iris.

The termination of iritis in suppuration, Dr V. Ammon allows occasionally to take place. He thinks, however, it is most common after wounds of the iris and cornea, and after violent shocks of the eyeball. Sometimes, also, it takes place in gouty subjects; but he allows that it rarely depends on iritis alone, and is more frequently a sequela of partial or general *ophthalmitis.* This puriform exudation assumes the form of hypopyon, that is, a collection of purulent matter in the anterior chamber, or what is more rare, it forms an abscess of the iris, which bursts and pours its contents into the anterior chamber. The secretion of purulent matter in *iridopyosis*, according to Dr V. Ammon, takes place suddenly, and not uncommonly when the disease appears to abate; and the author generally observed it towards night, which was spent without sleep from increase of pain. The purulent matter does not from the first assume the appearance of hypopyon; suppuration begins in separate flocks towards the inner and lower part of the iris. These are dissolved in the aqueous humour, which is thus rendered turbid; and as the secretion of matter proceeds, this fills the bottom of the anterior chamber, and forms hypopyon. He thinks that few physicians are aware of the marks of incipient hypopyon, which he says are only to be known by accurate examination of the inflamed iris by the aid of the lens. Hypopyon may be accompanied or followed by ulceration of the cornea, and sometimes by onyx. This state is most dangerous, as by it the cornea is often ruptured, or eroded, or ulcerated, so that the humours escape, and staphyloma following, the patient is the prey of incurable blindness.

The second kind of suppuration in the course of iritis consists in the formation of abscess in the parenchymatous substance of the iris, forming the iridoncosis of Dr Von Ammon. This is observed in partial iritis, sometimes in the pupillary margin, sometimes in the ciliary margin; but it always takes place near the *vasa vorticosa*, and is wont to be of a yellow colour. The tumour varies in size, being sometimes flat, sometimes prominent; a circumstance which may lead the observer to mistake it for an excrescence. Such tumour of the iris (*iridoncos*) is seldom absorbed. More frequently it is ruptured, and the matter is effused into the anterior chamber of the eye, forming secondary hypopyon. The walls of the opened abscess immediately after the rupture float to and fro like flocculi, in the anterior chamber, and gradually by absorption and contraction disappear. In the place of the abscess albuminous matter, yellow, black, or white may appear, and form an anterior synechia; or a black spot or a yellow-white spot, or a yellow spot is left in the iris. When these spots are black, they readily imitate the appearance of the iris; and the author is persuaded that those observers who maintain that, after abscess of the iris, a new pupil may arise, and say that they have seen it confound this sort of black spot with the pupil. He further thinks that in the place of abscess of the iris calcareous excrescences may be formed; but he allows that on this point he requires further experience.

Dr V. Ammon has not observed ulcers in the serous part of the iris, excepting those which follow the rupture of an abscess; and which he justly remarks, are not entitled to the name of ulcers, since abscesses of the iris opened in this manner are speedily healed by the effusion of coagulable lymph. He allows, however, that it is worth while to direct attention to this point, in order that some precise information on the subject of iridelcosis or ulceration of the iris may be obtained. Analogy is against the position, as the serous membranes are not liable to primary ulceration. The author does not, however, deny the possibility of the occurence of ulceration in the iris, if it have been destroyed by supparation, and if the abscess is open, and not disposed to unite.

On the anterior surface of the inflamed iris are seen, especially by the aid of a lens, vessels loaded with blood, various in size, course, and colour, according to their seats, and according to their origin.

Blood-vessels become manifest in serous iritis, when it becomes chronic, and when the serous membrane of the iris is affected with hypertrophy. These come into view at the ciliary margin, and more towards the pupillary margin, where they disappear in such a manner, that it is difficult to ascertain whether they go to the uvea or sink into the substance of the iris. From these vessels blood may be effused, causing discoloration of the iris, black spots on it, or muddiness of the aqueous humour; but more frequently they furnish the lymph, which assumes various shapes and colours, and at length they disappear.

In parenchymatous iritis, the author has frequently seen a beautiful net-work of blood-vessels in the very beginning of the disease, usually in the middle of the iris, or towards its ciliary margin. These vessels, which are manifestly in the parenchyma, and therefore not easily distinguished, are not new, but the proper vessels of the membrane distended and filled with blood. They are visible only a short time; and when exudation commences they become indistinct and disappear.

He allows, however, that towards the close of the parenchymatous iritis, when it has proceeded to *iridauxesis*, there arise in the anterior surface of the degenerated iris new blood-vessels, which run tortuously between the morbid elevations of the iris, are of a blue or red-black colour, and not unfrequently are so much distended with blood as to cause hemorrhage, *(hæmophthalmos,)* either by diapedesis or diabrosis. Such varicose vessels usually form a circle, which comes into view towards the pupillary margin, and from which issue individual branches, proceeding through the pupil into the posterior chamber.

This exudation of blood in iritis may take place in a small or great amount, or may be pure, or mixed with lymph or purulent matter. The effusion of blood in iritis, whether from new or from distended vessels, is always an indication that the economy of the iris is very much deranged.

Blood thus effused is, however, very often absorbed, especially if the iris was sound immediately before the attack of inflammation. When, on the other hand, the substance of the iris has suffered several attacks of inflammation, when the nature of the iris is dyscratic, that is, we suppose, when its circulation is previously in an unhealthy state, when inflammation, originally acute, often recurs, the blood is seldom absorbed, but assumes a brown or black colour, causing black spots on it, contributes to the formation of *iridauxesis*. Blood even is sometimes effused into the substance of the iris, causing *hypoaema*, which is known by the blood separating into its two parts, the clot and serum, as it does when drawn from a vein.

Lastly, either all or several of these morbid exudations may be combined in the same case.

The changes in the pupil have been partly noticed as the effects of inflammatory thickening, induration, or exudation and adhesion. The margin or border of the pupil is often more indistinct than in the natural state, and so tinged with *pigmentum nigrum*, that it appears to be denticulated or serrated;—an appearance which is not caused by loss of substance, but by the profuse secretion of this black matter.

The pupillary margin, however, when carefully examined, is irregular, especially in inflammatory irritation of the iris, or chronic iritis, and in bluish-gray eyes.

In chronic parenchymatous iritis, not uncommonly little bodies or tubercles are seen in the pupillary circle of the iris and its margin, yellow or brown in colour, and various in shape and size. These may proceed from, or be connected with, either the anterior serous surface, or the parenchyma, or the uvea. In the first case they float to and fro in the aqueous humour, or they may be firmly attached to the anterior surface of the iris. When they are connected with the uvea they generally cause synizesis of the pupil, or complete posterior synechia.

The reddish or pink-coloured circle or zone of vessels to which attention was first directed in this disease as completely pathognomonic, by John Cunningham Saunders, is invariably observed, though in different degrees. The present author regards it as not always the same in origin and nature. According to him it may be seated either in the ring of the conjunctiva, or to the extreme margin of the sclerotic coat, or in the ciliary circle, or in the venous circle of the iris.

1. The internal redness of the eye which usually accompanies iritis proceeds from the sclerotic coat, and surrounds the cornea

as it were with a red zone. This is chiefly observed at the beginning of the disease; for the anterior part of the sclerotic coat, which is in contact with the cornea, assumes a bright red colour, by reason of the numerous minute vessels, which are seen through the conjunctiva, which has hitherto undergone no change. This redness in the inflamed sclerotic presents this peculiarity, that the vessels conspicuous at the termination of the sclerotic go to the cornea in a straight line, and there forming ramifications make a reddish circle round the cornea. As the inflammation of the iris increases, the redness and enlargement of the vessels also increase; the vessels of the conjunctiva, which differ from those of the sclerotic in their cochineal red colour, greater compass, and more superficial position, are dilated in the anterior part of the eye, and its most minute and most crowded ramifications being entwined with the bright-red of the sclerotic coat, increase the red circle round the cornea.

2. The cornea is sometimes surrounded by a red zone, the vessels of which disappear suddenly at its margin, and assume more brilliant colours towards the internal part of the eyeball. In acute iritis the tint of this zone is deep red, and, according to the degree of the dilatation of the vessels, the rest of the surface of the eyeball is of a reddish colour. This vascular circle depends both on the annulus or ring of the conjunctiva, and also on the ciliary circle, which is very often attacked with inflammation either before or along with the iris.

3. The origin of the bluish circle which sometimes surrounds the cornea in iritis is different. The part of the sclerotic nearest to the cornea shows the circle filled with venous blood.

It is scarcely requisite to dwell on the subjective or rational signs of iritic inflammation. The most urgent are, intolerance of light *(photophobia,)* pain of the eye, and various degrees of weakened vision.

Iritis almost always continues for several weeks, sometimes for months; as it rarely terminates in resolution, if it have proceeded to its greatest and most intense degree; and its terminations are always dangerous to the integrity of the organ. Besides synizesis and different forms of synechia, and other changes already mentioned, iritis is liable to terminate in atrophy of the eyeball, or rarefaction of the iris, and other changes.

Iritis may be followed by more or less atrophy. If the cornea is affected with onyx or hypopyon, not uncommonly the cornea is ruptured, the humours escape, and complete atrophy of the eyeball ensues. In atrophy following iritis, after the inflammation is over, the eyeball appears smaller than natural. In such an eye the cornea is not round, but almost oblong; the iris is dull; the pupil not altogether round, but here and there angular, and tending upwards. The union of the cornea with the sclerotic is not natural; for at the spot at which the former passes into the latter, it forms a white circle more or less similar to the *arcus senilis*. A circle of this kind the author ascribes to inflammation attacking the ciliary body with the iris, and causing in the former condensation or atrophy. The anterior figure and aspect of the eyeball is changed, and the natural size of the eyeball is diminished.

Atrophy, or, as the author terms it, rarefaction of the iris, *(Iridaraesis,)* but which should probably be denominated attenuation of that membrane, is an affection of rare occurrence. In this disease, which the author has seen in blue or azure-coloured eyes only, the proper tissue of the iris becomes thinner than in the natural state, though whether from diminished secretion or increased absorption he does not know. The motion is either diminished or destroyed; its colour is pale, and as if dead; and the pupil is small, and its margins are irregular. The black pigment is more or less deficient, or it is so pale as to give the iris an ash-gray colour; and in one case the author observed a want in the substance of the membrane near its pupillary margin. This rare affection appears to be chiefly the result of chronic irritation, and is mostly observed among persons advanced in life; yet several times the author observed it in strumous children, whose eyeballs had been wounded. With it is sometimes associated *Iridodenosis*, and sometimes cataract.

Another consequence of chronic iritis is *Iridodenosis*, or the wavering iris,—that wavering motion in which, according to the motions of the eyeball, the iris is agitated to and fro towards the cornea, or towards the lens, without change in the pupil. This wavering motion sometimes presents the appearance of tremor, when it is difficult to tell whether the tremulous motion affects the whole parenchyma of the iris, or individual parts of the membrane. With this wavering of the iris, which must not be confounded with *hippus*, *(Nystagmus Bulbi,)* or the wavering motion of the whole eyeball, greater or less opacity of the lens, or even a floating cataract may be associated.

Iritis is also liable to terminate in cataract, especially when the inflammation affects the anterior part of the capsule, forming *Irido-periphakitis*. As this rarely ends in resolution, the usual result is opacity of the capsule. Dr Von Ammon, however, says, that the opacity of the anterior wall of the capsule is not the effect of the inflammation of the capsule, but that it arises from contact of the coagulable matter secreted upon the uvea or the margin of the pupil. This form of cataract is not incurable; and the physician who understands well the variable nature of this disease will cure it most readily. That form of cataract, however, is incurable which arises from inflammation of the iris, complicated with that of the choroid coat; and which is usually glaucomatous.

Among other terminations of iritis the author ranks inflammation of the choroid coat and retina, in consequence of inflammation extending from the iris to these tissues, constituting bad forms of amaurosis, and also hydrophthalmus and staphyloma of the sclerotic coat.

Lastly, the author adds, that when the iris has been once inflamed or injured by inflammation, it is very liable to be so again, and the subsequent attacks are always more injurious and more difficult to control or subdue than primary ones. It is then that not only is the inflammation liable to extend from the iris to the other tissues of the eyeball, but it is also liable to produce various new morbid growths, as hydatids, ossification, and fungous growths.

In speaking of the treatment required for the cure or alleviation of iritis, the author first observes, that the curative powers of nature are feeble, or rather altogether impotent. Every attack of iritis is difficult to be cured; every attack tends to the disorganization of the iris, or the connected parts of the eye; and the most energetic measures require to be promptly adopted, in order to avert, as far as may be, the bad consequences. Dr Ammon well observes, that there is in iritis no cure except resolution; and, consequently, everything which does not tend to promote this termination,—everything which does not contribute to abate or remove inflammation, without effusion of lymph, purulent matter, or other morbid products, has the effect of destroying the organ. The terminations of inflammation in other textures and organs of the body, in effusion of blood, lymph, or purulent matter, and which do not in all cases unfit the organ for its functions, are here most prejudicial, for, on the one hand, they limit, impair, or destroy the motions of the iris; on the other, they obscure vision, by destroying the translucency of the textures; and thirdly, by adhesions they render the pupil so small that it does not admit sufficient light, or they may close it altogether, forming *Atresia*.

The author forms two indications of cure; one to diminish and remove inflammation; the other to remove the sequelæ or consequences of the disease.

To accomplish the first indication the most important means are, copious and repeated general blood-letting, with other divisions of the antiphlogistic regimen. Dr V. Ammon recommends general blood-letting on the first day of the disease until the pains abate. The misfortune is, that, in employing this remedy, it is often impossible to tell the first day of the disease; and in almost all cases patients apply for assistance, not on the first day, but after the disease has been proceeding for days, or even weeks, and the pain in the eyeball and intolerance of light are no longer endurable. In the meantime, however, irreparable mischief is often wrought within the eye. It is, nevertheless, always prudent to employ blood-letting, even when morbid products are in the act of forming, because, by subduing the inflammation, it not only puts a stop to the secretion of these morbid products, but it gives some chance, however slight, of effecting their absorption. Dr V. Ammon thinks that in slight cases of iritis the application of leeches over the temples or the mastoid processes may be sufficient, with the caution to allow the blood to flow for some hours after the leeches have dropped off. There is no doubt that this mode of depletion is useful as an auxiliary; but they must be slight cases, indeed, in which such depletion has much effect, or produces so much impression on the disease as to act as a permanent means of cure.

Besides the co-operating antiphlogistic power of eccoprotic laxatives and cathartic medicines in general, Dr V. Ammon properly recommends the rigid observance of low unstimulating diet, and the active use of derivative or revellent agents. Of these the most efficacious is unquestionably blistering the temporal or posterior auricular regions repeatedly, or the use of the caustic or the cautery in the cervical region, or between the shoulders. Of the seton he disapproves rather strongly, as calculated to aggravate febrile symptoms.

In baths, warm or cold, and in all external applications, he places little confidence, and recommends little confidence to be placed.

A long list of internal remedies has been mentioned as useful in curing iritis; and hemlock, leopard's bane, senega-root, meadow saffron, sarsaparilla, tartarized antimony, golden sulphuret of antimony, muriate of baryta, calomel, corrosive sublimate, red precipitate, hydriodate of potass, and hydriodate of soda, carbonate of soda, carbonate of potass, volatile oil of turpentine, and cod-liver oil, are arranged in this list.

None of these agents, Dr Von Ammon thinks, have much real influence over the inflammatory process in which the disease consists; but he allows that they may, by exciting absorption, act in removing some of the *sequelæ* of the disease, and may also be beneficial in removing or rectifying the dyscratic condition which disposes to its formation. He therefore cautions the practitioner against placing any reliance on them, and impresses on him the necessity of forming a correct diagnosis, and then he will be most likely to treat the disease successfully.

On the alleged specific powers of mercury or any of its preparations he says nothing.

The traumatic form of iritis, or that which is the consequence of wounds or injuries of the eye, the iris, or some connected tissue, which is considered in the third chapter, differs from the idiopathic form of the disease in no respect, unless in its appearing more speedily after the application of the exciting cause, and in its proceeding more rapidly to the formation of morbid products and disorganization of the eye.

It hence requires the more prompt and energetic use of remedial measures.

In chapter fourth the author enters on a full and detailed account of the serous form of iritis, or that which affects the anterior surface of the membrane. It is chiefly distinguished by its connection with, or its liability to pass into inflammation of the cornea *(keratitis,)* and the consequent early appearance of the cochineal or pink-coloured ring or zone round the union of the sclerotic and the cornea.

This form of iritis Dr V. Ammon represents very rarely to take place in the state of health ; that is, it is most usually observed in cachectic persons, and as a consequence of wounds of the eye in those labouring under the strumous, the rheumatic, or the psoric distemperature. It is hence observed after operations for cataract, especially after keratonyxis or the anterior operation ; and the author has observed it very commonly among scrofulous infants, following either measles, scarlet fever, or small-pox, true or modified. Among adults it is observed after chilling ; but all such patients labour under the disposition to rheumatism and to itch, *(psora,)* or the pining decay of inveterate syphilis. We have already mentioned what we conceive to be the most natural explanation of this ; and we may here add, that the disposition to serous iritis is often induced by the operation of mercury on the economy.

Dr Von Ammon distinguishes this variety of iritis into sero-strumous iritis, sero-rheumatic iritis, and sero-cachectic iritis.

The fifth chapter is devoted to the subject of the parenchymatous iritic inflammation. Under this head the author distinguishes two general forms ; the simple parenchymatous iritis, consisting of the gouty and the syphilitic iritis ;—and the complicated parenchymatous iritis, consisting of syphilitico-mercurial iritis, syphilitico-arthritic iritis, syphilitico-scorbutic iritis, scrophuloso-syphilitic iritis, scrophuloso-psoric iritis, and the iritis scrophuloso-plicosa. These varieties are described chiefly with a view to variations in treatment. Our countrymen will perhaps think that Dr Von Ammon has been too minute and refined in his distinctions. But in answer to this, we must recommend them to study attentively his distinctions, and consider carefully what he says in their behalf.

Inflammation of the uvea is considered in the sixth and last chapter.

The most remarkable circumstance in this variety of iritis is the swelling of the whole iris, so as to protrude the membrane forwards into the anterior chamber ; and its tendency to produce opacity of the capsule.

This form of iritic inflammation the author ascribes to the operation of the gouty, the strumous, or the syphilitic distemperature ; to the state of the system induced by the puerperal condition, to abdominal plethora, and hepato-portal congestion, when there are generally hemorrhoidal symptoms, external or internal ; and, in short, to all those causes which disorder digestion and vitiate the fluids.

The treatment recommended is very similar to that advised for serous or parenchymatous iritis. But the author recommends strongly pure air, regulated diet, local blood-letting by leeches or the cupping-glass, the use of the revellents, diaphoretics, the free use of opiates when pain is very urgent, and the employment of the thermal baths of Carlsbad, Marienbad, and Egerbad.

We must not dwell longer on this essay. It is sufficient to say, that, as a monograph on iritis, it is a very masterly performance, and shows that the author has studied the disease most attentively, is intimately acquainted with its varieties, and is an ophthalmologist of great skill and judgment.

ART. V.—*The Transactions of the Provincial Medical and Surgical Association, instituted* 1832. Volume viii. London, 1840. 8vo. Pp. 435.

THE present volume continues to bear testimony to the diligence and spirit with which the Provincial Medical and Surgical Association conduct their proceedings, and to the valuable services which they are rendering to the cause of medicine, both as a science and as a profession.

Though the contents of the present volume are less numerous and varied than those of its predecessors, they are not less valuable. Besides the usual annual reports on the affairs of the Association and its economical objects, Medical Reform, benevolent assistance, and Quackery, it contains four articles,—all on subjects of great and general interest.

The first is the Report of the Section appointed to inquire into the present state of Vaccination, in which Dr Baron, the author, gives a clear and distinct exposition of the present state of knowledge.

The second article consists of the Retrospective Address delivered by Dr John Addington Symonds, containing an account of the progress made during the previous year in the several departments of medicine, under the heads of Anatomy, Physiology, Medical Pathology, and Medical Therapeutics. This discourse contains throughout, and at its conclusion, many profound and judicious reflections, which render it deserving the careful study of the philosophical physician.

The Retrospective Address on the progress in Surgery and Surgical Pathology, by Mr James of Exeter, embraces a larger range, and comprises the space of three years, from July 1836 to July 1839, to the former of which dates the subject had been carried by Mr Crowe. The present view is executed with the knowledge and judgment for which Mr James has been long distinguished, and cannot be read without much interest and instruction.

The paper with which the volume is concluded, that of Mr Ceely, has already been considered in its proper place.

PART III.

MEDICAL INTELLIGENCE.

ANATOMY.

On the Ganglia of the Human Heart. By M. Remak. (*Wochenschrift fur die gesammte Heilkunde,* 1839. No. 10.)—M. Remak, after having for a long time doubted the existence of nerves in the substance of the heart, has at length succeeded not only in demonstrating them, but also their nature; they are chiefly derived from the sympathetic nerves. M. Remak also discovered numerous ganglia, almost microscopical, in the substance of the heart of many of the domestic animals, and on extending his inquiries to that of man, found the same structures present there also. These ganglia he found in the transverse furrows of the heart, especially between the auricles and ventricles, where the nervous plexus are met with. They are very small, but are easily recognized, by the microscope, to be ganglionic in their structure. It is from this peculiar structure, probably, that the activity of the heart, independent of the brain, may be explained.

On the Structure of the Liver. By M. Lambron. (*Seances de l'Academie des Sciences,* 11th May 1840.)—M. Lambron's observations were made on the liver of the *Helix pomatia,* an animal in which the liver is of enormous size, as compared with the bulk of its body. Even with the naked eye, the liver is seen to be composed of an infinite number of small grains, about the 2060th part of an inch in diameter, and of a polyhedral form, the result of their grouping. When a small piece of this liver is put under the microscope, these granules are seen to be pouches filled with bile of a reddish-yellow colour, which may be easily shown oozing out when a portion of liver is pressed between two plates of glass, when nothing of the granule remains but a transparent membrane.

By injecting the liver he has also been able to show how these granules were supplied with blood, and how the bile escapes from them after its secretion. When the liver is injected through the great blood-vessel which leaves the heart, the injection is seen to fill the arteries to their most minute ramifications, when it is thrown out into the interspaces which exist between the granules, and thus bathes their walls. This disposition of the blood with reference to the hepatic granules is precisely analogous to what is observed with regard to the biliary secretory organs in insects, which in them are blind canals in immediate contact on their external surface with the vital fluid.

When the injection was pushed into the biliary ducts, the cells in which they terminate were filled by it, but the intercellular spaces were empty and not coloured. The injection by the arteries never filled the cells.

M. Lambron says he has satisfied himself that the structure of the liver in the Mammalia is precisely the same as that seen in the Helix. Each hepatic globule is merely an assemblage of cells, from which originate the biliary ducts; and the blood poured out into the intercellular spaces bathes immediately the walls of these cells.

On the true nature of the Hymen. By M. J. J. Virey.—(*Gazette Medicale de Paris*, 20th June 1840.)—M. Virey endeavours to prove that the hymen is nothing else than the raphe of the median line, dilated and dehiscent in the sexual organs of mammiferous females, and analogous to the frænum of the *glans penis* of the male sex. In the male the suture of the raphe remains connivent; but in the female, on account of the natural opening of the vulvo-uterine canal, this suture remains distended, stretched, and dehiscent.

From the comparison of the genital organs of the two sexes, he arrives at the conclusions; 1. That the fold of skin called the prepuce is analogous to the nymphæ; and, 2. That the membrane of the hymen is analogous to the frenum of the glans. This, he thinks, is very clearly proved in the case of hermaphrodites, and in embryos at the age when the sexual organs, still imperfectly developed, have not acquired their external developement. The penis is then no larger than the clitoris, the urethral canal opens inferiorly, whilst the scrotum is retracted inwardly, and constitutes the vulvo-uterine canal. But at the entry of this canal the raphe is obliged to dilate into a membrane which afterwards splits in its middle. It is thus that the hymen is formed in the female, evidently the same organ as the frenum of the glans in the male, which extends downwards, and forms the raphe in the perinæum.

Nature has not then created, as has been often supposed, in the hymen an express and especial organ for the sexual organs of the mammiferous females; (for it exists in most mammiferous animals, as M. Duvernoy has shown,) it is a simple modification of the same raphe which connects the two halves of the body, and which in one place forms the frenum of the tongue, of the penis, of the clitoris, and is shown clearly in the perinæum.

PHYSIOLOGY AND PHYSIOLOGICAL CHEMISTRY.

On Pepsine, the peculiar principle of the Gastric Juice. By M. Wasmann. (*Journal de Pharmacie*, July 1840.)—In our 48th volume, (p. 252,) 1837, we gave an account of the experiments of Professor Muller and Dr Schwann on Artificial Digestion in 1835 and 1836, and mentioned that the latter recognized in the digestive fluid of the stomach a peculiar principle, to which he gave the name of Pepsine, and to which he ascribed the power of dissolving and digesting all the matters allied to animal albumen. This principle, however, M. Schwann was unable to obtain in a state of purity. M. Wasmann has, however, succeeded in isolating this principle, which he thinks is contained in the grumous matter filling the cells of the glandular membrane of the stomach.

M. Wasmann prepares pepsine in the following manner. The glandular membrane of the stomach is separated without cutting it if possible, and digested for some hours in distilled water, at a temperature of 30° to 35° Cent. The liquid is then poured off, and the membrane washed occasionally with cold water till a putrid odour is developed. The liquids are then shaken together and filtered, when a transparent, slightly viscous fluid is obtained, endued with powerful digestive properties, especially if a few drops of hydrochloric acid be added. To separate the pepsine in a pure state from this fluid, acetate of lead is added, when a precipitate falls, which, after being washed, is suspended in distilled water, and decomposed by a stream of sulphuretted hydrogen gas. The fluid is again filtered, evaporated to the consistence of a syrup, at a heat not above 35° Cent. and poured into absolute alcohol. An abundant flocculent precipitate falls, which, when dried with care, presents the appearance of a yellowish gum-my-looking matter, which does not attract humidity. This is the pure pepsine

This substance is soluble in water, imparting to it slight acidity, owing to its retaining obstinately a certain quantity of acetic acid. A solution slightly acidulated, and containing not above a 50,000th part of pepsine, will dissolve the white of an egg in six or eight hours; but it loses its digestive powers if heated to the boiling point, or saturated with potash.

On the Duration of Human Life. By Dr BELLEFROID. (*Bulletin Medicale Belge*, Aug. and Nov. 1839.)—It is generally considered that a generation lasts from 30 to 33 years, and that three generations are comprized in an age or century. This opinion seems to have been confirmed by the recent researches made at Paris, by M. Villot, Keeper of the Archives of France, from which it appears that the duration of a generation among the male sex has been very nearly 33½ years. Dr Bellefroid remarks that the number which expresses the mean duration of life of any people, expresses also the length of its generation. This is a self-evident statement. In Belgium, both of these correspond, being for the duration of a generation 30 years, and the same number expresses the average duration of human life. The number of deaths per annum amounted to 102,188, allowing 279 for each day, and 11.63 for each hour. Dr Caspar, who has had the patience to make a similar calculation for the whole earth, has estimated the total population at 960,000,000, and the mean duration of life at 33 years. From these data, the last of which is unquestionably too high, he computes that 29,000,000 die every year, 80,000 every day, about 3300 every hour, and 55 every minute.

Dr Bellefroid confirms what has been stated by others, regarding the greater probability of life in the female than in the male sex at all ages, and he shows that, even at the critical age of 45, the ratio of mortality for the females is actually less than for that of the males.

With regard to the influence of marriage on the duration of life, Dr Bellefroid shows that the probability of life of a woman who marries at 20 is 11 years greater than that of a single woman, and that this privilege is enjoyed through the latest period of life. But the advantages of matrimony in prolonging the average duration of life are not confined to the female sex, for, from the calculations which have been made, it appears that the probabilities of life for married men exceed those of single men by 19 years; thus exceeding that of the married female by 8 years, a difference probably caused by the mortality resulting from child-birth. Thus it appears, that, from the age of 20 to 30, the mortality of husbands to bachelors is as one to twelve, whilst that of wives to spinsters is only as one to six for the same period of life.

Complete absence of Menstruation. By M. KRUGER-HANSEN. (*Graefe's und Walter's Journal*, Vol. xxvi. No. 3.)—A woman of about 58 years of age, of a robust constitution, and who had always enjoyed good health, much younger in appearance than she really was, and in whom all the feminine characters were well developed, never in the whole course of her life had any discharge at all similar to the menses. She never had *fluor albus*, or any abnormal sanguineous discharges or sweats, to compensate for the want of the usual monthly secretion. It is added that the sexual appetite was present, but that she never had borne children. M. Kruger-Hansen, from this single imperfect case, draws the conclusion, that the menstrual discharge is not absolutely necessary to woman. It is obvious, however, that, before such a conclusion could be drawn, it would be necessary to ascertain whether all the organs were present, and well developed. The omission of this renders the case incomplete.

MORBID ANATOMY AND MEDICAL PATHOLOGY.

Case of Absence of one Lobe of the Cerebellum. By Dr GREENE, (*Dublin Journal of Medical Science*, July 1840.)—A young man, aged 20, died on the twelfth day of fever, in the Hardwicke Hospital. He was well made and muscular, and had the perfect use ot his limbs; but was deaf and dumb from his birth. The genital organs were well developed, and cicatrices of ulcers existed in each groin. The left lobe of the cerebellum was found to be altogether awanting; and the left *crus cerebelli* consisted merely of a small tubercle connected with the pons. The right lobe of the cerebellum and the corresponding crus were healthy. The *crus cerebri* of the left side was smaller than that of the right, and the annular protuberance, owing to the different developement of its left side, was irregular in its form, and placed obliquely, its longest diameter being from behind forwards, and to the right side. The origins of the nerves were normal. The right occipital fossa was remarkably shallow, and the *foramen magnum* was placed obliquely, its antero-posterior diameter being thrown towards the right side.

Case of absence of the Uterus in an adult Female. By Dr S. CHEW. (*American Journal of the Medical Sciences*, May 1840.)—An unmarried woman, 22 years of age, applied for advice, as she said she was suffering from amenorrhœa. She stated she had never menstruated, but that, for several years past, she had every month suffered from nausea, headach, an uneasy tension of the breast, pain in the back, and a sensation of fulness about the pelvis and lower part of the abdomen. These unpleasant feelings usually continued for three or four days, and terminated without any excretion from the vagina, or a vicarious discharge from any other organ. She had never laboured under any inflammation or painful affection of the sexual organs, and her health, strength, and spirits were uniformly good. Her countenance had a feminine expression; her mammæ were large and fully developed; her hips broad, and her whole appearance that of a well-formed healthy female. On examining the sexual organs, the external parts were found to be well developed, and had the natural appearance. The vagina, of the ordinary capacity in other respects, terminated abruptly, and without any previous diminution of its calibre about an inch and a-half above its orifice. The substance by which it was closed seemed, both to the touch, and also when examined by means of the speculum, to be continuous with the walls of the vagina, and possessed the same degree of firmness and density. When a catheter was passed into the bladder, and the finger introduced into the rectum, and the whole intervening space examined, by pressing the point of the finger against that of the catheter, no vestige of uterus could be discovered; the blind termination of the vagina could alone be felt. Many other physicians examined this woman, and all agreed in regarding her as destitute of an uterus. From the circumstance, however, of her having the periodic catamenial excitement, the well developed female form, and also the sexual appetite, it could not be doubted that she was possessed of ovaria; organs on which all the female peculiarities are found to depend.

Hypertrophy of the Columnæ Carneæ. By Mr ADAMS.—(*Dublin Journal of Medical Science*, July 1840.)—A man was subject to violent paroxysms of dyspnœa and palpitation, in one of which he expired. On making an incision into the cavities of the heart, the left ventricle was found to be almost entirely filled by the enlarged *columnæ carneæ*, two of which were particularly enlarged, as well as the *chordæ tendineæ* of the mitral valve.

Three cases of Acute Inflammation of the Aorta. By Dr. THIERFELDER.—(*Ammon's Monatschrift*, April 1340.)—1. A mason, 35 years of age, complained for some days of palpitations, oppression, and sensation of burning heat in his breast, and a dry troublesome cough; and awoke on the 5th of November with great increase of all the uneasy symptoms. On the arrival of Dr Thierfelder, half an hour afterwards, he was found insensible, with stertorous very slow breathing, and cold extremities. In a short while he came to himself, and muttered a few unintelligible words. His body was swollen, of a bluish hue, and covered with a cold sweat; his pulse was very weak and soft; the action of the heart scarcely perceptible; and the respiration so slow that he scarcely breathed five times in two minutes. Fits of suffocation returned at intervals, and he died about three hours after being seen.

The lungs were found adhering to the pleura at some points, but were otherwise healthy, and no fluid was met with in the cavity of the pleura. The pericardium contained nearly fifteen ounces of serous fluid. The heart was filled with blood, the right auricle enlarged, but the ventricles appeared healthy. The *vena cava* and pulmonary veins were much distended with venous blood, but no morbid alterations were observed on them.

The ascending aorta presented the marks of violent inflammatory action on its inner coat; it was highly reddened and injected, and this appearance extended to its numerous ramifications; while numerous patches of plastic lymph adhered strongly to its surface.

The other organs were healthy.

2. An unmarried woman, 23 years of age, was seized on the 20th August 1830, with a violent rigor, caused by a fright, followed by anxiety, oppression, and sensation of burning heat in the chest, violent cough, and bloody coloured expectoration, and considerable fever. Two days after this, palpitations of the heart, and fits of suffocation, with a constant dry cough were complained of. It was then she was seen by Dr Thierfelder. She had great anxiety, and was constantly groaning, and complained of a burning sensation and feeling of oppression at the upper part of the sternum, stretching towards the left clavicle, the neck, and the back. The respiration was hurried, and from time to time violent attacks of coughing came on, with fits of suffocation. The face was red and somewhat swollen, and the pulse was 160 in the minute, hard, but very small. She died on the night of the 22d.

The lungs were found healthy, only containing in their bronchial tubes a quantity of reddish frothy mucus. The pericardium contained nearly a pound of serous fluid. The heart was distended with black blood, but especially the right side, which was also paler and softer than usual. The left side, both auricle and ventricle, was firm, and appeared somewhat thickened. The internal membrane of the left ventricle of the heart, as well as that of the aorta, from its origin till opposite the third dorsal vertebra, as well as that of the coronary arteries, was reddened in consequence of inflammatory action. The internal membrane was considerably swollen in the aorta, so much so, that about a third of the diameter of the vessels was lost, and its surface was covered with an effusion of plastic adherent lymph.

The other organs of the body appeared to be healthy.

3. A clerk, 28 years of age, on the 24th of January, after washing himself with cold water, and sitting writing for several hours in a cold apartment, became chilled. He passed a restless night, and complained of rheumatic pains in his left arm and head. Next morning fits of suffocation came on, with a sensation of oppression and heat, together with a painful pulsating feeling at the upper part of the sternum, and of the left clavicle, stretching through to the back. The pulse was very quick, hard, and tense; the respiration was rapid; and he had troublesome fits of coughing. The abdomen was swelled, and painful to the touch; his tongue was dry, and he had considerable thirst.

Towards evening he got worse; the fits of suffocation were more severe; his body was swollen; his eyes injected and nearly insensible to the approach of light; his respiration very laborious; and his thirst almost unquenchable. He had also delirium. In addition to these symptoms, on the evening of the 26th he had ringing in his ears, which was much increased during the fits of coughing.

On the morning of the 27th these symptoms began to abate. The oppressive sensation of heat and palpitation still remained; the pulse was still 170 in the minute, hard and tense. Towards midnight, however, a copious warm perspiration, as well as a red miliary eruption, broke out over the body, and from that period he gradually recovered.

Acute inflammation of the aorta is always a disease difficult to distinguish. Dr Thierfelder considers the peculiar cough which attends sufficient in most cases to declare the nature of the malady. He always found it very frequent and very hard.

Wound of the Thoracic Aorta. by Mr Smith.—(*Dublin Journal of Medical Science*, July 1840.)—A boy, 16 years of age, was stabbed with an iron nail rod in a scuffle with a smith who worked in the same forge with him. The instrument entered the left side between the sixth and seventh ribs, passed through the lung close to its root, and entered the aorta about an inch above the opening in the diaphragm for the passage of that vessel. The boy died about three and a half minutes after the receipt of the injury. About a pint and a half of coagulated blood was found in the cavity of the pleura. The cellular coat of the artery was only partially divided by the instrument, whilst the middle coat and lining membrane were ruptured throughout their entire circumference.

Encephaloid Disease of the Bones, Liver, Lungs, and Lymphatic Glands of the Chest and Abdomen. By Mr Smith.—(*Dublin Journal of Medical Science*, July 1840.)—A man, 77 years of age, remarkably large and muscular, and having all the appearance of general good health, was admitted to the hospital on the 17th of January, with the ordinary symptoms of chronic bronchitis, attended with emphysema. He remained without any peculiar alteration till a few days before his death, when he was attacked with pneumonia of the lower lobe of the right lung, which terminated fatally on the 23d.

On dissection the usual phenomena of bronchitis with emphysema were discovered, and in addition to these the right cavity of the pleura contained a large quantity of sero-sanguineous fluid. The lower lobe of the right lung presented an example of pneumonia in its third stage; the rest of that organ was free from inflammation. The surface of the lung at the diseased portion was of a bright fawn colour, produced by a stratum of purulent matter lying immediately under the pleura, and when an incision was made into it a large quantity of purulent matter escaped. Throughout the remainder of the lungs, on the surface as well as in the substance, there were a number of encephaloid tubercles of various sizes. The glands of the posterior mediastinum were in a similar state of degeneration. They formed a considerable tumour, and had elevated the pleura from the spine on the right side, and from the aorta on the left. The aorta adhered so firmly to these glands, that it could not be separated from them without some difficulty; but it did not appear to have suffered any compression, nor did there seem to be any impediment to the flow of blood. On opening the abdomen the liver displayed a fine specimen of the *tubera diffusa* of Farre. The tubercles existed both deep in the substance, and also on the surface of that organ, and in the latter situation presented the usual cup-shaped indentations. The gall-bladder and the biliary ducts were healthy. It was observed that the process of softening generally commenced in the interior of these tubercles, so that when one of them in this state was examined, a cavity was found in the centre resembling that of an abscess. The abdominal glands along the course of the aorta and *vena cava* were similarly diseased, and adhered to the neighbouring vessels. The remaining organs of the abdomen were healthy, excepting the spleen, the capsule of which presented the cartilaginous degeneration. The body slipped off the table during the dissection, and one of the vertebræ fractured. This led to an examination of these bones; and on removing a portion of the spinal column opposite to where the thoracic glands were found so much diseased, a distinct circumscribed tubercle, of a pale rose colour, was met with in the centre of one of the bodies of the vertebræ. The ribs, clavicle, and sternum presented similar morbid degenerations. In some of the bones the encephaloid matter was found deposited in the form of tubercles, in others in a state of infiltration, as it were, through their substance. The aorta from its commencement to its bifurcation was covered in various parts with atheromatous and earthy deposits; and in many places the internal coat of the artery was destroyed.

On Carcinoma of the Hepatic Ducts. By Dr THOMAS GORDON HAKE. —(*Treatise on Varicose Capillaries, &c.* London, 1839, 4to.)—Carcinomatous enlargement of the hepatic ducts is of frequent occurrence in the rabbit, and manifests itself in that animal under the apparent form of small abscesses. The fluid purulent-looking matter, however, which fills these ducts consists not of globules of pus, but of ovate corpuscules, containing a central nucleus, within which are imbedded molecules of a greater or lesser size; in fact, consists of tubercular matter. The outer surface of the ducts were apparently healthy; but the inner surface exhibited a thick, irregular, morbid growth, which, when examined by means of the microscope, proved to be composed of plexuses of capillaries, derived from the portal vein, and also from the hepatic artery. These plexuses were, however, seen to consist of varicose, not healthy vessels, their tubes being in some parts dilated to an extraordinary degree, and knotted, whilst in other parts they were contracted. Dr Hake asserts, that the increase of these plexues "alone constitute the growth of carcinoma, and their different degrees of varix its progressive softening." It is from this diseased structure he supposes the puriform-looking tubercular matter which fills the ducts is formed. The same diseased structure occasionally occurs in the human subject, and can be traced to have the same anatomical characters.

On softening of the Stomach in Infants. By Dr ISELIN de MULLHEIM. (*Archives Generales de Medecine,* Juin 1840.)—This disease was first accurately described by Dr Jaeger of Stuttgard in 1811, in Hufeland's Journal. Since that period various notices of it have been given to the public, particularly by Winter, Lenhossek, Chaussier, Laisné, Gairdner, and Wagner. It generally attacks children under one year of age, though it is occasionally met with till they reach the age of puberty. It varies much in its duration, sometimes proving fatal within twenty-four hours, and at other times not for several weeks. It occurs both in the idiopathic and symptomatic form; the latter form being observed as a consequence or symptom of cerebral disease, acute eruptive disorders, or affections of the respiratory apparatus.

In the idiopathic form the disease exhibits two distinct stages, *1st*, of irritation, and *2d*, of paralysis.

During the first stage, that of irritation, the child is observed to be restless and fretful for some days previous, when a smart febrile attack comes on, with quick pulse, dry hot skin, burning thirst, sleeplessness, violent vomiting, increased when any food is received into the stomach. These symptoms are rapidly followed by diarrhœa, the matters first passed being of a grayish colour and of considerable consistence, afterwards consisting of a yellowish acid serum. Writhing of the face is observed to precede the alvine evacuations, and they are also excited by pressure on the abdomen, which is usually much distended. There is great prostration of strength. The temperature of the abdomen, and particularly of the region of the stomach, is often much elevated, whilst the extremities are cold; partial sweats are observed, particularly about the head.

When the disease is more violent it comes on very suddenly, the child faints frequently; the pulse is irregular and very quick; the eyes and features sink; the body is bathed with perspiration; convulsions at first slight, afterwards more severe, and strabismus are observed. The face assumes a blue colour; the diarrhœa and vomiting, which were first present, soon stop, or only one continues; the fits of fainting and convulsions become more frequent, and in one of these the child expires.

Nearly the same symptoms are observed when this softening of the stomach is a secondary affection, only that then they are masked by the original disease, and are more apt to be overlooked, until they have gone on so far as to produce organic alteration of the structures of the stomach.

The above enumerated symptoms are not present in every case. The swelling and increased heat of the abdominal, but especially of the epigastric region, with the cold extremities, is perhaps one of the most characteristic and constant symptoms. The swelling, once it has supervened, never disappears, and even after death, the form and position of the stomach may be recognized through the abdominal parietes.

The agonized expression of countenance peculiar to diseases of the abdominal region, as also the sunk appearance of the eye, are almost invariably present; even during the first stage of the disease, that of irritation; in the latter stage of the disease they are peculiarly well marked.

The brain or its membranes were never observed by Dr Iselin distinctly inflamed, but the blood vessels were often remarkably turgid. Cammerer, however, noticed various organic changes in the substance of the brain, and the *pons Varolii* and *medulla oblongata* very much firmer than usual. The lungs were usually turgid with blood, and in some parts exhibited traces of inflammatory action; and the same was noticed of the mucous membrane of the bronchi. In only one case was any thing approaching to softening of the tissues observed.

The abdominal cavity was distended by gaseous fluid, and the cellular tissue of its parietes emphysematous. The stomach was distended with air as well as the whole intestinal canal, and was often perforated in one or more points, or if not, was so much softened as to yield on the slightest touch. In the greater curvature of the stomach, especially at that part to which the spleen is attached, transparent discoloured spots were noticed, across which the fibres of the muscular coat could be distinctly seen; these melted away between the fingers, they were so much softened. This softening rarely extended beyond the lowest parts, though some observers have noticed it to extend to the whole stomach. Distinct traces of inflammation were occasionally observed surrounding these softened spots.

The softening appeared in every case to have extended from the internal to the external structures, and to have been caused by inflammatory action. In the same stomach the appearances were often presented in different points of mere softening of the mucous coats, softening of the mucous and sub-mucous and fibrous coat, and complete softening or perforation of all the textures.

The spleen was very generally softened and discoloured on those parts which were in contact with the stomach. The diaphragm was rarely affected.

The intestinal canal usually presented inflamed and softened spots; and in one case the duodenum was found completely softened, almost diffluent, as well as many spots and patches over the small intestines.

Dr Iselin attributes the disease to inflammation, and not to a chemical erosion, as was supposed by Hunter, Cammerer, Jæger, and others. The arguments in favour of the disease being owing to inflammatory action, are very strong, and at least prove that all the appearances could not be explained on the supposition of its being dependent on chemical erosion from the formation of an acid in the stomach. In a great number of the cases, and, above all, when the disease was raging as an epidemic at Gottingen, softening and perforation occurred simultaneously, both in the stomach, intestines, œsophagus, lungs, and mesentery. Such appearances could not have been presented if they depended on the formation of an acid in the stomach, whether that acid was generated from the coats or the contents of the stomach or from the spleen. In fact, Dr Iselin is inclined to think the disease may be cholera, modified by occurring in the infantile constitution.

The disease appears to be only curable in its first stage. When paralysis or convulsions once make their appearance the case generally ends fatally. The strict antiphlogistic treatment is recommended; leeches to the abdomen and head. Vesications and sinapisms also were found efficacious, and after the bowels were cleared out by means of castor oil, other purgatives being found hurtful, slight astringents and bitters were administered. The disease was rarely stopped, in spite of all the remedies going on to its second stage and ending fatally.

Cases of Rupture of the Spleen. By Dr G. SOTIS. (*Il Filiatre Sebezio,* February 1840.)—Dr Sotis relates four cases of rupture of the spleen, of which the following is a short abstract.

1. In 1834, —— received a blow from the foot on the left hypochondrium, and instantly expired. On dissection the spleen was found divided into two parts, as if it had been cut with a sharp instrument. The abdominal cavity was filled with blood.

2. In the month of September 1831, Angela Bove received a blow from a stone on the left hypochondriac region, and instantly fell down quite dead. The whole of the abdominal organs were found in their normal condition, excepting the spleen, which was largely ruptured, and the abdominal cavity was filled with blood.

3. In the month of August 1838, Onorata Ricci, 18 years of age, fell from a height of about twenty feet. He was taken up insensible, and died in a few hours. On dissection a large quantity of blood was found effused into the abdominal cavity, and the spleen was divided transversely into two parts. All the other organs were sound.

4. On the 26th November 1839, Argangelo Velletis, gardener, 15 years of age, in a quarrel, had a stone thrown at him, which struck him on the left hypochondrium. He instantly fell motionless and never moved. At the medico-legal examination, made in presence of many medical practitioners, the spleen was found split in two in its longitudinal direction, and each of these portions had two deep fissures; so that at first sight the spleen presented the appearance of having been cut into six pieces on its concave aspect. Much blood was also effused into the abdominal cavity.

Dr Sotis attributes death partly to the nervous shock sustained through the solar plexus, and partly to the rapid hemorrhage; and the instantaneous nature of the death favours such a supposition; but cases have been related where the sudden death produced by a blow on the hypochondriac region could only be attributed to the first of these causes, as on dissection no organic lesions whatever could be detected.

On the Epidemic Puerperal Fever of 1838. By M. VOILLEMIER. (*Journal des Connaissances Medico-Chirurgicales,* December 1839, January 1840.)—Two distinct forms of puerperal fever were met with by M. Voillemier; the first of an inflammatory, the second of a typhoid type.

The inflammatory form made its attack by a slight rigor, soon succeeded by intense pain in the hypogastric region, or in the *iliac fossa*, in general limited to one spot. General reaction soon succeeded, and the pulse, which during the rigor was depressed, rose to 130 beats in the minute or more. The skin became hot and covered with perspiration; the face became flushed; and the eyes lustrous. Frontal headach, often very intense, soon followed, and the breathing became hurried. This first period terminated by copious perspiration; occasionally, however, reaction did not commence till after the employment of copious depletion.

This form of puerperal fever in general yielded to the antiphlogistic regimen, though it occasionally terminated fatally; but it was by no means so intractable or fatal as the typhoid form.

The typhoid form of puerperal fever began with a long and severe rigor, which often came on a few hours after delivery. The pain in this form extended over the whole abdomen, and was often so intense that the weight of a cataplasm was insupportable. The abdomen became rapidly swollen; the pulse was feeble, undulating, very easily compressed, about 150 in the minute, often so quick as to be counted with difficulty. The respiration was hurried, and the anxiety extreme. There was intense frontal headach; the countenance was sunk; the face pale, and covered with a clammy sweat, which gave it the appearance of being varnished. Soon after this constant purging and vomiting wore out the patient. The matters vomited were of a green colour, and the feculent discharges were very fetid. Death usually occurred at the end of a few days, sometimes of a few hours. The patients were generally sensible to the last.

In the inflammatory form the bowels were constipated, whilst diarrhœa prevailed in the typhoid type. In neither of the forms did the suppression or continuance of the flow of the lochial discharge, or that of the milk, appear to have any marked influence on the disease.

The morbid appearances were as follow. In 22 out of 24 cases purulent matter was found infiltrated in the sub-peritoneal cellular tissue, and in that of the pelvis. In two cases purulent inflammation of the lymphatic vessels, but of small extent, was met with. In three cases uterine phlebitis was noticed. The uterus itself was in most cases free from all marks of lesion. In a few cases small collections of purulent matter of the size of a pea were found scattered through its substance, but never an abscess of any size. These were in general nearer the external than the internal surface of that organ. Purulent infiltration was more frequently met with in the sub-peritoneal cellular tissue of the uterus, and that which occupies the pelvic cavity. This tissue, in fact, was in some cases so loaded with purulent matter, that when cut through it presented a greenish surface, and in many points abscesses of the size of a chestnut were met with. In six cases the peritoneal coat appeared healthy. Various morbid appearances were observed on this membrane; its vessels were found injected, presenting various arborescent forms; its surface was found covered with a serous fluid, more or less transparent, but more generally puriform; purulent matter and false membranes were also often observed over its surface. In one case there was perforation of the stomach. In three cases abscesses in the muscular parts of the arm or leg were met with; in one case purulent matter was found in the elbow and wrist joints; and in six cases purulent deposits were noticed in the cavity of the pleura.

M. Voillemier could not distinctly trace these diseases to the direct action of cold or any peculiar atmospherical state. He, however, regarded as predisposing causes, close apartments, want of ventilation, an impure atmosphere, and elevated temperature; also insufficient or bad food, privations of all kinds, and neglect of the state of the body during pregnancy. He thought that in a few cases he could trace the propagation of the disease to contagion. Those who were delivered by means of instruments appeared to be more particularly subject to the disease. Of fourteen instrumental cases, six were attacked with this puerperal fever and four died.

M. Veillemier in conclusion remarks, that "puerperal fever may be considered as a disease essentially general, of which the anatomical character consists in the existence of purulent matter in some part or other of the body."

As to the treatment he places the greatest confidence in the antiphlogistic regimen; viz. the local and general abstraction of blood; cataplasms to the abdomen; injections when the lochia are fetid; and purgatives, especially in the inflammatory form. He thinks he has seen two instances of persons owing their lives to mercurial frictions.

Case of Intus-susception, with Polypus of the Ileum. By Mr SMITH. (*Dublin Journal of Medical Science*, July 1840.)—A woman of spare habit applied for relief at one of the hospitals of the House of Industry, on the 25th January 1840. She stated that she had been attacked the day before with pain in the abdomen, vomiting, diarrhœa, and tenesmus. At the time of her admission her bowels were constipated, but the vomiting and tenesmus continued until the 27th, when she died; her symptoms having strongly resembled those which have been observed to accompany internal strangulation of some portion of the intestinal tube. No tumour could be detected during life, either in the abdomen, or in any of the situations where hernia is usually met with.

On laying open the abdominal cavity, the intestine presented the anatomical characters of the first stage of peritonitis, but there was no effusion of lymph, serum, or purulent matter. The termination of the small, and commencement of the large intestines formed a tumour of considerable size, extending from the left side downwards to the right iliac *fossa*. This tumour was found to be constituted by an invagination of the ileum, about twelve inches of which had passed through the ileo-cæcal valve, into the cæcum and colon. A pear-shaped fleshy polypus, about an inch and a-half in length, grew from the ileum, and seemed to be the cause of the invagination.

Case of Salivation from the use of Hydriodate of Potash. By Sir FRANCIS W. SMITH. (*Dublin Journal of Medical Science*, July 1840.)—A young man had been treated in the Hospital about a year and a-half before, for the venereal disease, but was dismissed without being cured. For the five weeks previous to his being seen by Sir F. Smith, he had been taking Plummer's pill. He was much reduced in flesh and strength, and had a bad cough; he suffered from pains in the shins and scapulæ; had sore throat, and an eruption of a copper-colour upon his arms and shoulders. He also complained of tenderness, and even pain in the frontal sinus and bones of the nose, from which dark-coloured matter and crusts, but without any peculiar fetor, were discharged. He was ordered sarsaparilla in powder, and ten grains of the hydriodate of potash, gradually increased to fifteen daily. By three weeks his cough nearly left him, and he had increased greatly in flesh and strength. He complained less of the pain or tenderness in the frontal sinuses, and the discharge from the nose had ceased. His appetite was improved and he slept well. But what was most remarkable, was that he was salivating freely, and his front teeth were all loose, as if he had been undergoing a course of mercury, with this difference, however, that there was no fetor of the breath.

Case of Palsy of the Face, illustrative of the Functions of the Lingual and Glosso-pharyngeal Nerves. By M. VOGT. (*Muller's Archiv*, Jan. 1840.)—A woman, between thirty and forty years of age, corpulent and in good health, contracted a paralytic affection of the left side of the face, in consequence of leaving her bed-room window open during the night. It is unnecessary to enter minutely into the details of the case; but it was distinctly recognized to be a case of paralysis not only of the third branch, but of the entire trifacial nerve, with the exception, perhaps, of the muscular branch. Not only the chin and the half of the tongue, but all the left side of the face, were insensible. The conjunctiva of the left eye could not be irritated by means of needles; no tears were excited by this means. The external part of the ear was insensible to the touch as well as a large portion of the posterior and lateral parts of the head. It was difficult to ascertain how far the muscular parts were paralyzed. She said she could chew as well as ever; but whenever the mouthful escaped to the left side of the mouth she stopped chewing, as she was not aware of its presence there, and supposed that it had fallen out of her mouth. It is more than probable that the muscles of that side of the face had been paralyzed, and that mastication was effected by the unparalyzed muscles of the other side of the face; as mastication was performed very irregularly. One very remarkable circumstance was noticed, which was, that the left side of the tongue, though it had lost its sensibility, preserved its sense of taste quite entire. The woman was cured by means of electricity in six weeks.

MEDICAL THERAPEUTICS.

Twelve Tæniæ expelled by a decoction of the Pomegranate Root Bark. By Dr Mongeal. (*Archives Generales de Medecine*, July 1840.)—A lady, 32 years of age, and having all the appearance of health, had complained for seven or eight months of general uneasiness and feeling of weight in the epigastric region; at times also her abdomen became suddenly swollen. She had, in general, a disgust at food, occasionally, however, her appetite was inordinate; she had frequently desire to vomit, but never vomited. Her tongue was enlarged and covered with a white fur. She complained of an occasional pricking or tearing pain in the region of the stomach; and when she ran she felt a body which she compared to a bladder full of water moving up and down in the epigastric region. She had frequent attacks of diarrhœa. Twice she had had convulsive fits of an hour's duration during the night, attended with loss of consciousness, but had no recollection of them when she awoke from sleep next morning.

As from these symptoms the existence of intestinal worms was suspected, the stools were carefully examined for some days, when a few joints of a tenia were discovered. A strong decoction of the root-bark of the pomegranate was therefore administered, and about an hour afterwards a large knotted mass of tæniæ was suddenly evacuated. On unrolling this mass twelve separate worms were discovered, and their aggregate length amounted to 157 English feet.

The unpleasant symptoms immediately afterwards disappeared.

Cases of Hemeralopia cured by the exclusion of Light. By Mr W. L. Wharton. (*American Journal of the Medical Sciences*, May 1840.)—Sergeant W. and privateer A. and R., of the 2d Regiment of Artillery, had suffered partial loss of vision for several nights previously, the defect commencing with the decline of day. The last night they had been affected with total blindness. Their general health was good; they only complained of slight uneasiness in the temporal region. The pupils of the eyes were much dilated, though not immovable, but at night, when the blindness returned, they were found more dilated, and were not affected by the sudden introduction of a lighted candle into the room. Active, general, and local remedies were used without success from the 3d to the 15th February 1834, when Mr Wharton resolved to try the effect of the complete abstraction of the stimulus of light from the eye. They were, therefore, the whole day confined to a dark room, and by night it was found that vision was partially restored. By repeating this the next day also, the sight was found to be entirely restored, and by the 18th they returned to duty.

Two other similar cases are related as occurring in May and September 1835, where confinement to a darkened room for 24 hours sufficed to effect a cure after other medical treatment had failed.

On the 6th of February 1839, seven cases came under Mr Wharton's care, one of which had existed for three months, all the others above a fortnight. The men had been on severe duty in the mountainous districts of North Carolina, their eyes being much affected by the rays of light reflected from the snow. With the exception of one case of constitutional scorbutis, all the patients were in good health. The pupils, in the eyes of all, were dilated and fixed, especially towards night. No medicine was administered; but they were all confined in a darkened apartment for thirty-six hours, and at the expiration of that time the vision of six of the patients was restored, but 24 hours longer were required for the scorbutic patient, when all returned to their duty.

Case of Ischuria Renalis of nine years standing, with Vicarious Vomiting of Urine. By Dr F. L. Kreysig. (*Hufeland's Journal*, July 1839.)—A woman, 25 years of age, began to complain of abdominal pain, general spasm, difficulty in voiding urine and feces, and afterwards of orthopnœa and symptoms of thoracic and abdominal inflammation, which were treated antiphlogistically. The urine required to be drawn off by the catheter. She also suffered pain in the right knee, and generally kept that limb drawn up towards the abdomen. Two years afterwards, the legs began to swell, the respiration became more difficult, the urinary secretion ceased, and she vomited from time to time a fluid containing, according to chemical analysis, the principles of urine.

Dr Kreysig now detected in the right iliac region, near the spine, a tumour extending towards the liver, and exquisitely painful to the touch. The patient had observed this tumour four years previously. The bowels were costive, and twice a-day urinous vomitings occurred, accompanied by fits of dyspnœa so severe as twice to require the aid of venesection to relieve them. The bladder was empty. Tepid baths were now used, and mercurial and stimulant liniments applied to the region of the kidney. When the patient was in the bath her skin exhaled a very fetid odour.

The tumour continued to enlarge, and four months after it became harder and more painful, and pointed in the epigastric region. Three weeks afterwards, during a violent spasm, it burst, and discharged a large quantity of purulent matter, accompanied with a great increase of all her sufferings. Six weeks from this period the urinous vomiting ceased, and she began to pass urine by the natural passages. Shortly afterwards, during a spasmodic attack of pain, and an urgent desire to evacuate the bowels, she passed a mass as large as a goose's egg, resembling fat mixed with purulent matter, and intolerably fetid. From this period the abdominal pain and swelling disappeared, and menstruation, which had been stopped during the period of her illness, returned, and within nine months her health was completely re-established.

MATERIA MEDICA.

Colocynth Oil, a substitute for Croton Oil in Neuralgia, Sciatica, &c. By M. G. Janelli. (*Observatore Medico*, Jan. 1840.)—Dr Janelli mentions that he has found the oil of colocynth a valuable and cheap succedaneum for croton oil, as an external application in neuralgic affections, but especially in sciatica. He relates in detail three cases of its efficacy in sciatica, and three in cases of rheumatism. After frictions with the oil, the patients generally fell asleep, so much were their sufferings alleviated, and in a few days were so far recovered as to be enabled to return to their usual avocations.

It is to be regretted that no details are given as to the mode in which this oil is prepared, whether from the colocynth seeds by expression, or from some preparation of the pulp of the apple.

On Sulphate of Copper as an Emetic. By Dr A. Toulmouche. (*Gazette Medicale de Paris*, 23d May 1840.) As much uncertainty seemed to prevail with regard to the sulphate of copper being a safe emetic, and also regarding its dose when administered with this intent, Dr Toulmouche administered it in varied doses to 72 patients, and the following are the results he obtained.

The dose of 10 centigrammes (1.5 grs. English,) was given to 12 women, and in nine of them produced vomiting. Five vomited once; one vomited twice; three vomited thrice; and two four times. It also produced purging in four of the cases.

In the dose of 20 centigrammes (3 grs.) it was administered to 36 women, and excited vomiting in 32; and the average number of times each vomited was thrice. It also acted on the bowels in 23 of the cases; causing from one to three alvine evacuations.

In the same dose it was administered to five men, and in all it produced violent vomiting, eight times in each. In four it acted also slightly on the bowels.

To eight women it was given in the dose of 30 centigrammes (4.5 grs.) and it caused vomiting in all three times; it caused purging in six cases.

To eight women it was administered in the dose of 40 centigrammes (6 grs.) and excited vomiting in all to the number of from three to four times; and in four it produced alvine evacuations.

When administered in the same dose to two men it produced vomiting in one only, and one stool; on the other it had no obvious effect.

Lastly, it was given to one woman in the dose of 60 centigrammes (9 grs.) but no effect was produced by it. In nearly one-half of the above cases it caused griping.

M. Toulmouche from these cases concludes that it is a sure and safe emetic; and in no respect more dangerous than the preparations of antimony; but that its purgative effect cannot be depended on.

On Sulphate of Zinc as an Emetic. By Dr. A. Toulmouche. (*Gazette Medicale de Paris*, 6th June 1840.)—Dr Toulmouche shows some want of information as to what is known in this country with regard to the effects and doses of medicines. He never ventured to administer this medicine in doses above 75 centigrammes, or 11.5 grains English; it is, therefore, not wonderful that he found it to be a very inferior emetic; no fewer than 33 cases failing out of 83 to whom it was administered. The only wonder is that it succeeded so often; but the fact may be explained in this way, that the greater portion of the individuals to whom it was administered were labouring under "embarras gastrique," and such being the case, the nauseous metallic taste of the medicine would be of itself quite sufficient to excite an evacuation of the contents of the stomach. He expresses great astonishment at the doses which English practitioners are said sometimes to give, viz. 100 centigrammes to 2 grammes (15 to 30 grains), but explains it by supposing it could only have been in cases of poisoning by opium. In our own experience sulphate of zinc has been found to be a very safe and efficacious emetic in the dose of 20 to 25 grains, neither exciting nausea nor much retching; in fact, it is the most pleasant emetic with which we are acquainted.

On the Hydrocyanoferrate of Quinine. (*Dublin Journal of Medical Sci-*

ence, July 1840.)—Notwithstanding the valuable febrifuge virtues of the sulphate of quinine, it is well known that it occasionally fails. In such cases the hydrocyanate of quinine has been used with good effects. But as this is a salt subject to decomposition, Signor Bertozzi of Cremona, has proposed to substitute the hydrocyanoferrate of quinine, whose powers over the worst forms of intermittent fever have been completely established.

Dr Zaccarelli has prescribed this new medicine in a great number of cases in place of sulphate of quinine. It is found to cut short tertian and quartan fevers; and, what is well worthy of the attention of physicians, it has principally succeeded in cases where the sulphate of quinine has failed. Dr Carioli has also confirmed the febrifuge properties of this preparation.

The following is given by Bertozzi as the most economical process for obtaining it. One part of sulphate of quinine is to be triturated in a glass mortar to an impalpable powder; a part and a-half of the ferro-prussiate of potash, previously dissolved in six or seven parts of distilled water, is to be mixed by careful agitation, and the whole exposed in a flask to heat, stirring the mixture carefully until it arrives at the boiling point. In proportion as the liquid becomes transparent, there is precipitated to the bottom and sides of the flask a substance of a greenish-yellow colour, having an oily consistence. Having poured off the liquid portion, this substance is to be washed with distilled water, and then dissolved in very pure alcohol at 100° Fahr., and immediately filtered. On evaporating the alcohol, a mass, confusedly crystallized in needles, is left, the weight of which amounts to three-fourths of the sulphate of quinine used. This is the hydrocyanoferrate of quinine.

When in small fragments this substance is of a pea-green colour, and of an intensely bitter taste. It dissolves in cold, but better in hot alcohol, and is precipitated from its solution almost entirely by water. It is decomposed by sulphuric acid, and by the tincture, infusion, and decoction of cinchona. It has been given in doses of three grains and a half, repeated as occasion required.

SURGICAL PATHOLOGY, SURGERY, AND SURGICAL STATISTICS.

Case of Recovery from a Gunshot Wound of the Head, with Loss of Brain. By Dr H. Janson.—(*American Journal of the Medical Sciences*, May 1840.)—A young man, 19 years of age, accidentally fired his rifle when its muzzle was pointing towards his face, on the 19th of September last. The bullet first entered the left nostril, and laid it open so far as the nasal bone; it then penetrated the scull at the inner angle of the left superciliary ridge, and emerged from the cranial cavity, through the frontal bone, at a point about two inches above the place of entrance. The skin over the track of the ball was untouched, being merely lacerated at the points of entrance and exit.

He was seen by Dr Janson about an hour and a half after the occurrence of the accident. The whole surface of his body was cold, and of a livid colour; the pulse was 140 in the minute, tremulous and weak; his eyes were closed; he was in a state of coma, and his breathing was stertorous. He was scarcely sensible to the pain of incising the skin over the track of the ball. As far as could be judged he had lost about twelve ounces of blood, and particles of his brain were lying scattered upon the floor. The wound was dressed, the detached pieces of bone and brain removed, and a bread and milk poultice laid over the parts. The groove made by the ball in the interior lobe of the brain was ascertained by measurement to be six lines at its greatest depth.

On the 20th he was still in a state of coma, and his breathing stertorous. The surface was warm; the pulse 120, full, and regular. He was bled to sixteen ounces, and ordered a dose of Epsom salts.

Next day it was ascertained that his bowels had been freely moved; but his pulse was 110, and bounding, and there appeared to be great reaction; sixteen ounces of blood were, in consequence, again drawn from a vein.

On the 22d his pulse was 90, and strong; the breathing, was, however, less laboured, and he could be roused for a few minutes with some difficulty, but immediately relapsed into the comatose state. The head was very hot, particularly where the ball had made its exit, where an area of the scull was fractured to the extent of about three inches in diameter. Twelve ounces of blood were removed from the arm, and an ounce of Epsom salts was administered, followed by injections.

On the 23d an abscess was discovered pointing at the summit of the head, which on being opened discharged a few ounces of fetid purulent matter.

From this time the functions of the brain were gradually restored, and no untoward symptoms supervened, excepting a *fungus cerebri* vegetating from the entire length of the wound of the forehead. It grew daily, until in three days it projected over the eye, and was raised six lines above the surface of the surrounding skin. The surface of the fungus was paired off with the scalpel from day to day, without giving rise to any hæmorrhage or inconvenience to the patient, and simple cerate, with adhesive straps, were the only dressings used till the wound was healed.

For the first twelve days after the receipt of the injury the patient passed his urine and feces without any consciousness. After this period, however, he made signs when he wished to empty the rectum; but it was not till some days longer before he made any intimation of when he wished to empty the bladder. There was no paralysis of any organ at any period of his illness.

He completely recovered; and at the time the account was written appeared to be in the full possession of all his faculties, "except," says Dr Janson, "perhaps a slight imperfection of those organs phrenologically ranged in the course of the ball."

Case of destruction of seven of the Intervertebral Cartilages. By M. Nichet. (*Gazette Medicale de Paris*, 20th June 1840.) A girl, 20 years of age, of a weak lymphatic constitution, received a severe fall on the back when about 18 years old. She then complained of pains, at first very acute, but afterwards more obscure, in the lumbar region; and one year after the accident a gibbosity formed in the middle of the back. About this period she was first seen by M. Nichet, at which time the gibbosity was very apparent, but without pain; and a large abscess occupied the right lumbar region, and was very painful when she coughed; a large fluctuating tumour also filled the right inguinal region. She was also labouring under pulmonary consumption. The limbs slowly acquired an enormous bulk in consequence of serous infiltration, and serous fluid was also thrown out within the peritoneal cavity. Breathing became every day more laborious, and she died about two years after the accident.

The lower extremities were of enormous dimensions in consequence of serous infiltration. The peritoneum contained about five pounds of transparent serous fluid. On the right side between the base of the chest and the *iliac fossa* there existed an immense collection of purulent matter, which had pushed the diaphragm upwards to the level of the third rib. The liquid was grumous, and enclosed in a very thick fibro-cellular cyst, perfectly closed. The right iliac crest and fossa were denuded and rugous for a small extent. The lungs, which were filled with miliary tubercles, were very small, and closely and generally adherent to the costal pleura.

Opposite the seventh, eighth, and ninth dorsal vertebræ, the anterior vertebral ligament was raised into the form of a tumour as large as a hen's egg, by a quantity of serous fluid, holding in suspension numerous tuberculous particles. Behind this pouch the eighth and ninth dorsal vertebræ, whose bodies were almost entirely destroyed, inclined on one another, and corresponded to the apex of the gibbosity observed externally. Some few osseous fragments mixed with tubercular matter filled the angle which the vertebral column formed at this point. The anterior vertebral ligament was detached from the vertebræ from the second dorsal to the second lumbar, and between it and the vertebræ there existed an almost continuous layer of concrete tubercular matter, which thinned away gradually at its upper and lower extremities. Opposite the diseased vertebræ the tubercular deposit was of increased thickness, and formed masses which projected forwards and also backwards, filling up the osseous irregularities. No communication existed between the diseased bone and the ilio-lumbar abscess. Opposite the gibbosity the vertebral canal was entire with its membranes and medullary substance uninjured.

Not only was no trace of intervertebral cartilage found between the dorsal vertebræ which were diseased, but other six dorsal intervertebral cartilages had disappeared, without the vertebræ having undergone any other change than that of being simply denuded. These intervertebral cartilages, which were thus destroyed, were those from the fourth dorsal to the first lumbar vertebræ. The spaces formerly occupied by these cartilages remained empty, so that the thick blade of a bistoury could be freely passed between the vertebræ. The other intervertebral cartilages were in their natural state. The tissue of the vertebræ, even of those which were destroyed, presented not the least alteration of structure.

On Subcutaneous Wounds of the Joints. By Dr Jules Guerin. (*Seances de l'Academie des Sciences*, 4th May 1840.)—In a preceding memoir, M. Guerin sought to establish the fact, that wounds not involving the skin, and therefore, kept from exposure to the air, were not followed by inflammatory symptoms, and were usually healed by the first intention. In this paper, M. Guerin endeavours to show from experiments on man and the lower animals, that subcutaneous wounds of the joints, (*i. e.* those not involving the skin,) as of the tendons, muscles, aponeuroses, cellular tissue, nerves, and minute vessels, may all, by means of particular precautions, be healed by the first intention.

His first experiments were made on animals. He opened successively on two dogs, by the subcutaneous method, the humero-cubital, radio-carpal, femoro-tibial, and tibio-tarsal articulations; and when no air was allowed to come in contact with the opened joint, they healed immediately without exhibiting any traces of inflammatory action. When these articulations were, however, left free in their motions, synovial tumours formed around the joint: but if they were kept in a state of repose, and permanent extension, the cure was completed without any accident whatever. When the wounds were made so as to allow of the contact of air, or its introduction into the joint, inflammation and suppuration were excited, proportioned in extent and intensity to the duration of the contact of the air.

His next experiments were on man. Acting on the results furnished by these experiments, and also on what is every day observed in man, where, in luxation of the shoulder or hip-joints, though considerable injury is inflicted on the capsular ligament and neighbouring parts, no inflammatory symptoms are set up, provided the skin be not torn, he ventured to operate on man. He has many times made a subcutaneous section of the ligaments, and a portion of the fibrous capsule of the knee, and of the foot, to remedy deformities of these joints; and in no instance have these operations been followed by inflammatory action.

The precautions which must be taken in order to insure the subcutaneous wounds of the joints from inflammatory accidents, are, to make the aperture in the skin very small, and as far as possible from the articulation; to make it while the limb is extended, and not when it is bent; and to keep the limb after the operation in the most perfect state of repose. These two last directions are the consequences of a theory which M. Guerin has endeavoured to establish, which is, that articulations are, during their movements, the seat of a partial temporary enlargement, which causes in them a tendency to produce a void, so that if the limb was flexed or extended after the operation, a suction takes place at the orifice of the wound, and air is drawn into the joint.

In the third part of his paper, M. Guerin shows the practical uses of his discovery, in the art of surgery. Serous, sanguineous, and purulent collections of matter in the articulations may, by the same means, be drawn off with safety. But it is chiefly to its advantages in aiding the reduction of old luxations, or removing deformities by incising the ligaments or tendons, that M. Guerin directs the attention. He has already by this means cured a congenital luxation of the clavicle which had resisted all known means. He made numerous incisions of the ligamentary apparatus around the head of the bone, and after two operations, so conducted, succeeded in bringing it into its proper place, and curing completely the deformity.

Successful treatment of Dropsy of the Synovial Membranes by Tartar Emetic. By M. Gimelle.—(*Bulletin de l'Academie Royale de Medecine,* 4th July 1840.)—M. Gimelle has found the administration of tartar emetic in large doses very efficacious in curing dropsy of the synovial membranes; causing complete absorption of the fluid, with abatement of all inflammatory symptoms, if any exist. Twenty-seven cases of dropsy of the joints have been treated successfully by him. He, without any previous treatment, commenced by giving four grains of tartar emetic in the twenty-four hours, and increased the dose by two grains every day, till from eighteen to twenty grains were taken daily. As soon as toleration of the medicine was established, the fluid began to be absorbed, and the cure was in general complete in from eight to sixteen days.

In only five of these cases was vomiting excited by the medicine, in two cases for three days. In eight cases it produced alvine evacuations; but its most general and constant effects were diminution of the strength and quickness of the pulse, weakness of the voice, abundant nocturnal perspirations, and the appearance of a dark circle around the eyes. In almost every case the appetite remained unimpaired. M. Gimelle regards this plan of treatment as the most successful ever yet proposed for the treatment of dropsy of the synovial membranes.

Radical Cure of Inguinal Hernia by the Horizontal Position. By M. P. Biagini. (*Bulletino delle Scienze Mediche.* Jan. 1840.)—M. Ravin some time ago made known to the public his new mode of curing hernia radically, by merely confining the person, for a length of time, strictly to the horizontal posture, and applying over the abdominal ring gentle compression, &c. M. Biagini has lately verified this statement, by having had a patient who was afflicted with a large inguinal hernia, which had existed for two years, accidentally confined to his bed with another disease for upwards of three months. At the end of this period, when the man arose, to his delight, he found that the hernia did not return. No tumour was perceptible in the region of the inguinal canal, and he could cough and exert himself in every way without producing a return of the complaint. The man was 32 years of age.

This case, confirming the views of M. Ravin, appeared to justify M Biagini in drawing the following conclusions.

1. That it is possible to obtain a radical cure of some herniæ by the horizontal posture long-continued.

2. That this cure takes place in consequence of a diminution in the size of the side of the canal and the contraction of its walls, which again assume the oblique course, which they had lost; which changes take place in virtue only of the tonic powers of the tissues.

3. That in order that the tissues should have sufficient tonicity to produce this important change, the person must be possessed of considerable vital energy; a circumstance which will prevent old men from being treated by this plan, both on account of their general weakness, and the danger of a long-continued horizontal posture to them; and lastly, it would be of no use in very large herniæ, where the canal is reduced to the state of a simple ring, and so altered, that no tonic force of the parts could restore it to its normal condition.

Case of Extirpation of part of a Rib on account of Neuralgia. By Dr E. H. Dixon.—(*New York Journal of Medicine*, July 1839.)—Jane Bailey, aged 30, was thrown out of a carriage, and dragged for about a mile. She was taken up insensible, and, though pretty severely bruised, no lasting injury resulted. Acute pain was, however, complained of over the anterior or sternal extremity of the tenth rib, which was not relieved by the ordinary treatment; and in a few weeks this portion became the seat of a small irregular projection, and the pain became constant and very severe. She was repeatedly cupped for this affection; but after two years of suffering resolved to submit to any operation rather than longer endure the pain. She had fallen off much of late, and was troubled with an occasional dry cough, and constant loss of sleep. The pain would occasionally abate for a few hours, and then return with increased severity.

As on a consultation being held it was agreed to be a case of neuralgia, it was resolved to remove the projecting portion of the rib, as the only probable means of affording relief. Dr Dixon, therefore, carefully removed about two inches of the rib, by means of a very cautious dissection, leaving the cavity of the pleura unopened. The cartilage was found to be not attached to the projecting or sternal extremity. Not a bad symptom ensued; the wound healed in a week; the pain did not return; and she had since improved in health and strength.

On the best mode of closing Apertures or Fissures in the Palate. By J. G. Greig, Esq. Surgeon-Dentist. In a Letter to the Editor of the Med. and Surg. Journ.—Sir, Having been consulted in a case of fissure of the palate in 1831, when practising in Glasgow, I was led to give my attention to improve upon the methods adopted, for giving relief to persons afflicted in this way; and whilst pursuing the subject, I looked into Mr Thomas Bell's work on the teeth, published in 1829, and found an observation in page 267 which was exactly what I wanted, and I have ever since followed the plan there stated. It is at once simple and effectual; but as the method of fixing the plate is not given, I had to supply this from my own imagination. I cannot pass from this subject without bearing my humble testimony to the merits of the work of this able writer; certainly the best work on the teeth which has appeared in the English language since the days of Fox and John Hunter.

I shall describe the plan minutely. I first take an accurate cast of the roof of the mouth, from which I form a thin plate of gold, embracing almost its whole surface, protecting or covering the aperture or fissure, (in scrofulous and syphilitic cases of loss of the palatine bone,) and resting by a very simple method by means of two wires or clasps on the inside of two of the teeth on each side. The mechanical support thus given to the lips of the aperture facilitates their coming together and ultimately closing. Mr Bell mentions having succeeded in more cases than one in producing such an effect. And there is one case in my own practice, where I have great hopes of such a result, which occurred in a gentleman from syphilitic ulceration, where there was considerable loss of bone. In this case, the loss of substance in the bony palate was so great, that an elliptical aperture about six lines long and five broad was formed, when the plate was first introduced in 1833. This was so much diminished in size by the method now mentioned, that in March 1840, it was not above one line and a half long, and less than one broad.

There is another advantage that a plate so constructed may be removed with the greatest ease by the patient, which is of no small importance, as it requires frequent cleansing.

The general mode of constructing plates for this purpose, is by making them of much smaller dimensions, and having a sponge attached, which goes into the aperture to keep them in *situ*. This, of course, increases the size of the aperture, and also perpetuates the evil. There are other methods still in practice, which are even more complicated, by which the plate is fixed by means of a screw and nut.

My mode of practice soon became known to the profession in Glasgow, and in consequence I had a number of cases. It may serve to make the subject still more clear to state the particulars of one case. I select for this purpose that of a young lady, about 18 years of age, of a strumous habit, who, when I was consulted in 1835, was suffering from ulceration of the palate, from which there was a continual discharge of fetid pus. Exfoliation of the bone had taken place to a considerable extent, which left a passage into the nose nearly the size of a small nutmeg. This of course impeded deglutition, both solids and liquids being liable to pass into the nose, and the voice so much affected as to render it difficult to be understood. I got a plate made as described above, which immediately on its insertion gave complete comfort in swallowing and restored the voice; in short, rendered the palate artificially perfect. This was all that could be expected in such a case, unless that the attending surgeon should succeed in arresting the progress of the disease and checking the formation of pus, in which case the plate will facilitate the closing of the parts.

Congenital cases require the plate to be made to go a little further back. The benefit to be expected, however, is not so great in such cases. The speech is certainly much improved by the use of a plate and deglutition assisted, but neither are rendered so perfect as in cases produced from disease, in consequence of the entire want of the velum, and partial want of the uvula.

I shall be happy to show the application of a plate, and a few casts, and explain the subject more fully, to any person who will do me the favour of calling at my house. This I am the more anxious to do, from having shown cases, and explained the subject to above thirty medical friends in Edinburgh, not one of whom, to the best of my recollection, had ever seen a plate so constructed before.

I shall probably also take an early opportunity of explaining my mode of constructing masks,—a substitute for the Taliacotian operation, which has been highly approved of.—I am &c. J. G. Greig.

3, Dundas Street, Edinburgh, 1840.

On the comparative frequency of Hernia according to the sex and age, and also relatively to the population. By J. F. Malgaigne. (*Annales d'Hygiène Publique*, July 1840.)—After enumerating the difficulties attending an inquiry of this kind, M. Malgaigne compares the results which have been published with regard to the comparative frequency of hernia, with those which have come under his own observation.

1. *Comparative frequency of hernia in the two sexes.* According to Louis at Salpetriere, an hospital for women, 3 out of every 100 were affected with hernia; whilst at Bicetre, an hospital for men, 6 of every 100 had hernia, and at the Hospital des Invalides the proportion was a fraction greater. This

gave a proportion of 2 men for every 1 woman afflicted with that disease. At Amsterdam, Jean Monnikoff found the proportion of men greater, being nearly 3 males to 1 female with hernia. M. Mathey says, that, at Anvers, the proportion is as 4 men to 1 woman, and Mr Lawrence that, at London, the proportion is so great as 6 to 1.

M. Malgaigne, in order to arrive at something like an approach to the truth, collected carefully the number of the cases, both male and female, who applied for bandages or pessaries during the years 1836 and 1837, and also part of 1835, at the Bureau Central des Hopitaux. He found that during October and November 1835, 435 cases of hernia, or prolapsus of the vagina, had occurred; and that of this number 335 were males, and 100 females; giving a proportion of 3½ males to 1 female. But if those who applied for prolapsus of the vagina alone be cut off, 410 cases of true hernia still remained—of which number 335 were males, and 75 females; or 4½ males to 1 female.

For the year 1836 the proportional numbers of those afflicted with hernia were 2203 males, and 594 females, or very nearly 4 males to 1 female. This does not include the cases of prolapsus of the vagina or uterus.

For the year 1837 the proportion was very nearly the same, viz. 4 males to 1 female; the numbers being 1884 males and 489 females. From these facts he draws the conclusion, that in Paris, amongst the lower classes, four males are afflicted with hernia for every female so situated.

2. *The influence of age on the occurrence of Hernia.* The results will be most easily understood by consulting the following table drawn up by M. Malgaigne.

	1836.			1837.		
Ages.	Males.	Females.	Total.	Males.	Females.	Total.
From birth to 1 year	48	7	55	30	8	38
1 to 2 years	16	7	23	29	7	36
2 years	18	4	22	14	2	18
3 years	11	4	15	9	1	10
4 years	9	0	9	9	4	13
5 to 13	53	12	65	45	6	51
13 to 20	83	8	91	76	7	83
20 to 28	118	17	135	108	23	131
28 to 30	47	9	56	33	12	45
30 to 35	119	26	145	112	28	130
35 to 40	237	53	290	181	47	228
40 to 50	410	131	541	312	111	423
50 to 60	457	118	575	385	98	483
60 to 70	367	119	486	324	100	424
70 to 75	133	31	164	132	18	150
75 to 80	62	13	75	65	15	80
80 and upwards	15	5	20	20	2	22

From this it appears that hernia, which is pretty common in the stage of infancy, becomes gradually rarer as life advances till it attains it minimum about the eighth or ninth year; and after this period of life gradually becomes more and more frequent till the close of life. In fact, the susceptibility to the disease seems to increase with the advance of years.

3. *Of the comparative frequency of Hernia in men from 20 to 21 years of age.*—M. Malgaigne has chosen this age for the illustration of the comparative frequency of hernia among the male sex, as it is the only one which permits of sufficiently accurate data being obtained. The French laws regarding the recruiting of the army necessitates the taking of an accurate census of the male sex of this age every year, and as hernia is a cause of exemption from service, the relative numbers of those afflicted with it are pretty accurately ascertained. From 1801 to 1810, the number of recruits examined at Paris was 25,503, of which number 694 were rejected on ac-

count of hernia, or about 1 in every 36 men. In the environs of Paris, of 5100 recruits 140 were rejected on account of hernia, or about 1 in 36. From 1816 to 1823, of 9636 recruits examined at Paris, 261 were exempted on account of hernia, or about 1 in 37 men; and in the environs, of 1894 recruits 53 were exempted, or about 1 in 35. If, from this number of recruits, be abstracted all those who have been rejected on account of deformity or deficiency of height, and who were consequently not examined with regard to the presence or absence of hernia, the proportion falls to about 1 in 31 or 1 in 32. The accurate tables published by order of Government of the recruits from 1831 to 1836 inclusive, show the same result, viz. 1 rejected for hernia out of every 31 men.

4. *The comparative frequency of Hernia to the total population* is only given on calculation, having no very fixed data to go on, except the ascertained points of the comparative frequency of hernia in the male sex at 21, and the proportions at the different ages as given in the table quoted above, and the relative frequency of the complaint in the male and female sex. With these ascertained facts, M. Malgaigne calculates that no fewer than one-twentieth of the total population are afflicted with hernia.

5. *The relative frequency of hernia to the total population at different ages*, as ascertained by calculation, is given in the following table:—

From birth to 1 year the proportion of hernia in males is as 1 to 20·67

1 to 2 years,		1 to 29·09
2 to 3	—	1 to 36·87
3 to 4	—	1 to 55·64
4 to 5	—	1 to 59·72
5 to 13	—	1 to 77·31
13 to 20	—	1 to 41·72
20 to 28	—	1 to 30·74
28 to 30	—	1 to 20·23
30 to 35	—	1 to 16·58
35 to 40	—	1 to 8·41
40 to 50	—	1 to 6·37
50 to 60	—	1 to 5·54
60 to 70	—	1 to 4·37
70 to 75	—	1 to 3·27
75 to 80	—	1 to 3·74

6. *The proportion of Hernia amongst the rich and poor.*—Paris being divided in twelve arrondissemens or wards, the proportional number of conscripts rejected on account of hernia from each of these furnishes a pretty accurate statement as to the comparative frequency of the disease amongst the wealthy, the middling, and the indigent classes of the population. Thus from 1816 to 1823, in those chiefly inhabited by the indigent classes, 1 was rejected, on account of hernia, out of every 28 men, at 21 years of age. In the wards inhabited by the middling classes, 1 was rejected out of every 38 men; and in those inhabited by the rich, 1 out of every 37 men.

7. *Relative frequency of Hernia in the different departments of France.*—It would be impossible to give, in a short space, any thing like an intelligible statement of the result of M. Malgaigne's researches on this subject. It may be stated, in general terms, that hernia was found to be more rare among the mountainous or hilly districts than in those of the plain, and less frequent in towns than in the country; and less also amongst the pure French race, than amongst those where the races are crossed with people of other countries. A coloured chart of the departments accompanies the descriptions of this part of the subject, the different depths of colour over which exhibit the relative frequency of hernia in each.

OBSTETRICS.

Injury done to the Fœtus in utero felt by the Mother. (*Seances de l'Academie Royale de Medecine,* 12th May 1840.)—MM. Piedagnel and Cotterau were called to a woman in difficult labour. On introducing the finger into the vagina during the uterine contractions, a fluctuating tumour was felt projecting through the *os uteri,* which was taken by M. Piedagnel for the membranes of the fœtus; M. Cottereau, however, having observed that, whenever it was touched, the mother complained of pain, arrived at the conclusion that it was a tumour connected with the genital organs of the mother. Each medical attendant being confident in his own opinion, M. Piedagnel wished to rupture the amniotic tumour, as he believed it to be, but the attempt to do this produced so much pain to the mother, that he was obliged to desist. Labour went on, and finally the child was born. It was a breach presentation, and what had been taken for the amniotic pouch or accidental tumour was nothing else than the scrotum of the child infiltrated with serous fluid. The curious circumstance in this case was, that the mother was sensible of pain whenever this part of the child was roughly handled; and the narrators of this case endeavour to account for it on the supposition of the existence of nervous filaments communicating by means of the cord between the mother and child. The existence of such nerves, however, has never been satisfactorily proved; and, if the case be correctly narrated, other explanations must be sought for. Our present knowledge is too imperfect to admit of hazarding a conjecture as to the means by which such a communication could be effected.

TOXICOLOGY.

Case of Poisoning with Nitrate of Silver.—(*Bulletin Generale de Therapeutique,* September 1839.)—A man, 21 years of age, on the 22d June, swallowed in solution an ounce of the nitrate of silver. The quantity said to be swallowed was probably exaggerated, nevertheless it must have been very considerable, from the extreme violence of the effects, and from the matters, which the patient vomited twelve or eighteen hours after taking the dose, blackening the sheets and curtains of the bed wherever it touched them. When brought to the Hospital of Saint-Louis he was lying in a state of insensibility, and he did not exhibit signs of sensibility in any part of his body. There were convulsive movements of the face and upper limbs; the jaws were firmly closed; the eyes rolled up; the pupils were dilated, and insensible to the stimulus of light. A solution of salt was given freely. After the lapse of an hour and a half the pupils became less dilated, and the convulsions and closure of the jaws ceased. The salt water was continued for eight hours, when emollient drinks were substituted. The insensibility at this period was less profound, but the patient suffered much from violent pains in the epigastric region. It was not till he had been eleven hours in the hospital that sensibility returned, and he was able to speak. Some hours afterwards profound coma with insensibility returned, and continued for two hours; and both next day and the day after he had a similar attack. After this convalescence proceeded uninterruptedly, and he was discharged well on the 29th June.

STATISTICS AND MISCELLANEOUS MATTER.

Mortality in the City and County of New York for the year 1839. By Mr W. A. WALTERS. (*American Journal of the Medical Sciences,* May 1840.)—The whole number of interments within the city during the year 1839 was 7953; being 100 less than the previous year. Of these 7491 were from among the white population, and 462 from the coloured. Of the whole number 4389 were males, and 3564 females. Mr Walters was unable to explain the cause of the great disparity in the mortality of the two sexes; but it is by no means difficult to account for it as the chief mortality in

New York occurs amongst Europeans, not the natives; and it is known that more than four-fifths of the Europeans who land on the American shores are males. It is, therefore, quite in consonance with the relative proportions of males to females in New York, that nearly a fourth more of males should die annually than females.

Of the whole number of deaths in persons above ten years of age, 1419 were natives of America, and 1853 were Europeans.

The months of July, August, and September, were those in which the greater number of deaths occurred; whilst the fewest occurred in April, May, and June.

The mortality in children under five years of age has long been the subject of remark. During 1839, excluding the still-born, more than one-half of the deaths, or 3696, occurred in children before the completion of their fifth year. The diseases most fatal within this period of existence were marasmus, inflammation of the brain, hooping-cough, measles, scarlet fever, dysentery, diarrhœa, *cholera infantum*, croup, convulsions, hydrocephalus, and teething.

The mortality from pulmonary complaints, including all the disorders of the respiratory apparatus, was nearly equal to one-third of the total number of deaths. The deaths from pulmonary consumption alone amounted to 1315, being an increase of 90 over that of the previous year. The mortality from pulmonary consumption may be rated at one-sixth of all the deaths; but the average varies amongst the different classes of the population. Of those above ten years of age who died of this disease, more than one-half were Europeans. Of the 5554 deaths amongst the native white citizens, only 610, or one in nine occurred from consumption. Of the 1853 deaths amongst the European population, 563, or about one in three and a-quarter, were caused by consumption; and of the 462 deaths amongst the coloured population, 132, or one in three and a-half, were occasioned by the same disease.

The tables showed 68 deaths from small-pox; but it was supposed that very few of the whole number, if any, had ever been vaccinated.

Royal College of Surgeons of Edinburgh. Studentship in Comparative Anatomy and Natural History.—The Royal College of Surgeons of Edinburgh, with the desire of encouraging the study of comparative anatomy and natural history by their licentiates, have recently instituted two studentships in these departments, to be held for the term of three years, with an annual allowance of L. 20 to each. In furtherance of the objects of the College, we have much pleasure in stating, that the General Commanding in Chief of the Army has, by the recommendation of the Director-General of the Medical Department, been pleased to grant, once in three years, the appointment of Assistant Surgeon in the army to such student as should be recommended by the College, and found qualified after the usual examination by the Army Medical Board.

One of these studentships will be filled up by the College in 1841, under the following regulations:—

1. Candidates shall be Licentiates of the College under the age of 24, who have studied at least two winter sessions at the medical School of Edinburgh, and have made some progress in the knowledge of comparative anatomy and natural history; to be ascertained by examination or otherwise as the College may deem expedient.

2. The application of candidates shall be given in before the 1st of December 1840, accompanied by certificates of character and acquirements.

3. The successful Candidates shall be employed in the Museum, under the direction of the Conservator and Curators, and devote themselves to the pathological departments, as well as to the study of comparative anatomy and natural history.

4 They shall be examined annually; and if their progress be found defective, or their conduct improper, the appointment shall be cancelled.

We cannot mention the resolution of the Royal College of Surgeons now announced, without directing attention to the desire which the members of the College have always evinced of improving the education of the candidates for their diploma, and elevating, to as high a degree as is practicable, the standard of accomplishment among these gentlemen. With the present comprehensive curriculum of education, and the strong inducement now held out to cultivate the knowledge of comparative anatomy, and consequently a most important and fertile branch of physiological knowledge, the Candidates for the surgical diploma of the Edinburgh College ought to be the best educated, and the most intelligent order of professional men in the three kingdoms.

GRADUATIONS AND SURGICAL EXAMINATIONS.

Medical Graduations at Edinburgh.—On the 30th of July 1840, the Senatus Academicus of the University of Edinburgh conferred the Degree of Doctor of Medicine on the following gentlemen, in number one hundred and eleven, after having gone through the appointed examinations, and defended publicly their Inaugural Dissertations.

OF SCOTLAND.

Robert Brunton Anderson, on Aneurism by Anastomosis and its Treatment.

Alexander Borthwick, on Dislocation of the Hip-Joint.

Matthew Burton, on Dyspepsia.

Alexander Grant Cumming, on the Anatomy and Pathology of the Eye.

David Davidson, on the principal diseases which prevailed in the Bridewell of Edinburgh during the years 1837 and 1838.

Jas. Moyes Deas, on Yellow Fever.

Andrew Halliday Douglas, on Bronchotomy in Croup.

Charles Murray Duff, on Delirium Tremens.

George Easton, on Pneumonia.

Frederick Forbes, on the Nature and History of Indian Plague.

John Forbes, on Erysipelas.

George Cowie Forbes, on Metastasis and Sympathy.

John Fraser, on Tetanus.

Wm. Ritchie Glennie, on the Physiology of the Circulation.

James Henderson Hardie, on the Diagnosis and Treatment of Stone in the Bladder.

Robert Harkness, on some disputed points in the Pathology of Tubercles.

James Hornell, on Inflammation.

George Ledingham, on Dysentery.

James Lee, on Varix.

Archibald Little, on the Pathology of Dropsy.

Cosmo Logie, on the Total and Partial Division of the Prostate Gland in the Lateral Operation of Lithotomy.

Jas. Neil Dryburgh Login, on the Anatomy, Physiology, and some of the Diseases of the Conjunctiva and Eyelids

John Charles Mackenzie, on Necrosis.

Philip W. Maclagan, on the Entozoa which inhabit the Human Body.

John Macrae, on Uterine Hemorrhage.

James O. M'William, on the Pathological condition of the Gastro-Enteric Mucous Membrane during and after certain Forms of Fever.

John Robert Miller, on the Physiological and Therapeutic Operation of the Solaneæ.

Wm. Mure Muir, on Syphilis.

George Mushet, on Insanity, with its Pathology and Treatment.

Robert Scott Orr, on the Pulse.

George Rae, on Ophthalmia.

George James Shaw, on the Anatomy, Physiology, and Development of the Dental System in Man.

Archd. Sibbald, on Corrosive Sublimate.

John Alex. Smith, on Animal Materia Medica.

Wm. C. Thorburn, on the Etiology and Pathology of Syphilis.
Robert Todd, on Arsenic, Medically and Legally considered.
William Traill, on Scrofula.
Henry Walker, on Muscle, its Structure and Physiology.
David Walker, on Hemorrhoids.
George Williamson, on Lithotomy.
Jas. Ballantyne Woodcock, on Diabetes Mellitus.

FROM ENGLAND.

Joseph Abbott, on Hernia Cerebri.
Robert Askwith, on the Morbid Appearances which occasionally take place in the Intestines during the progress of Fever.
Francis Barlow, on Goitre.
Charles Paget Blake, on the different species of Iritis.
Herbert John Giraud, on Vegetable Embryology.
Rt. Mortimer Glover, on the Physiological and Medicinal Properties of Bromine and its Compounds.
William Gordon, on the Means by which we judge of the Direction of Sound.
Alfred Hall, Hydrophobia or Canine Madness.
John Hastings, on the alleged complete and frequent Decay and Regeneration of the Organic Solids of the Human Body.
Charles Horton, on some of the Diseases peculiar to Women.
Graham Lacon, on the Nature and Treatment of Rheumatism.
William Henry Lowe, on Jaundice from Non-elimination, with Remarks upon the Composition and Pathology of the Bile.
William O. Markham, on the Surgical Practice of Paris, illustrated by Cases.
Thomas Wood Morrison, on Muscæ Volitantes.
F. W. Smith Packman, on the Edinburgh and Paris Fevers.
Geo. Leopold Perfect, on Abortion, its Causes, and Treatment.
Chris. Robt. Pybus, on the Theory of the Formation of Pus.
William Saunders, on Dislocations.
George Scratchley, on Phlebitis or Inflammation of Veins.
Wm. Milthorp Spence, on Veratria.
Henry Taylor, on Asthma.
R. Southby Otto Thring, on Hysteria in Females.
Arthur Ed. Turnour, on the Anatomy, Physiology, and Development of the Organ of Hearing.
John Tosswill Veitch, on the Pathology of Dropsy.
George A. Walker, on the Evidence afforded for the belief in the Existence of Central Heat, and its effects on those exposed to it.
Rice Wasbrough, on the Formation and Evolution of the Human Ovum.
Owen William Williams, on Gastro-Enteritis, and its Complications.
Robert Wills, on Neuralgia.
William Edward Gilchrist Wilson, on Morbus Coxarius, Coxalgia, or Hip Disease.
George John Wood, on Hydrocele of the Tunica Vaginalis.
Francis Wright, on Chlorosis.
John James Wright, on Secondary Purulent Deposits.
Samuel Wright, on the Physiological Action of Mercury and its Chlorides.

FROM IRELAND.

Henry Overend Bowman, on Infantile Convulsions.
George Sackville Cotter, on Inflammation of the Bowels.
Francis Dill, on Erysipelas.
Robert Dundas, on the Typography and Endemic Diseases of Bahia.
Michael Leahy, on Phthisis Pulmonalis.
Joseph M'Clelland, on Inflammation of the Veins.
Wm. R. M'Laughlin, on Bronchial and Pulmonary Hemorrhage.
Alexander Marks, on Rupture of the Urinary Bladder.
Simon Sheil, on the Natural Habits of Salmon, with some Obervations on their Generation and Growth.
Henry Stacy Skipton, on Infanticide.
Bartholomew Stephens, on Pulmonary Consumption.
Henry Tomb, on Scarlatina.
Alexander Tyler, on the Formation

of Callus, or the Process by which Fractures are re-united.

Jas. Hutcheson Whiteside, on Syphilis.

John Shaw Willes, on Contagion.

FROM THE ISLE OF WIGHT.

Chas. Wise Hollis, on Rheumatism.

FROM THE EAST INDIES.

Francis Black, on Sanguineous Tumours on the Scalps of New-born Children.

John Colin Graham, on the Secale Cornutum, or Ergot of Rye.

Stephen Edward Comyn, on the Prostate Gland, its Diseases, &c. &c.

Jn. M'Donald Hay, on the Changes the different diseased states of the Body produce on the Urine.

Jas. George Kemp, on Encephalitis.

Fras. Da Cruz M'Cowan, on the Induction of Premature Labour.

George Edward Morton, on the Diagnosis of Pulmonary Disease.

Chas. Fred. Stephenson, on Fever.

FROM THE CAPE OF GOOD HOPE.

John Andrew Horak, on Sthenic, Idiopathic Pneumonia.

Oloff Fehrszen, on the Nature, Causes, and Treatment of Uterine Hemorrhage.

FROM THE MAURITIUS.

Julius Veronge, on Syphilis.

Charles George Wiehe, on Cataract, Glaucoma, and Amaurosis.

FROM BARBADOES.

Sandford Arnot, on Inguinal Hernia.

Samuel Lewis, on how far may the Deposit of Tubercular Matter be considered the result of Inflammation?

FROM TRINIDAD.

Robert Johnston, on Infanticide.

FROM DOMINICA.

Bruce Allan Bremner, on the Origin, History, and Treatment of Syphilis.

FROM JAMAICA.

John Power Trench, on the Cause of Spectral Illusions.

James Stewart Tulloh, De Mensibus Muliebribus.

FROM NORTH AMERICA.

Harry Peters, on Cancer.

Alexander Rowand, on Uterine Hemorrhage.

Robert Tomes, on the Mind, as a Morbific, Prophylactic, and Therapeutic Agent.

Surgeons' Hall Edinburgh, 1st August 1840.—Since Whitsunday last, the following Gentlemen have offered themselves as Candidates for the Diploma of the Royal College of Surgeons of Edinburgh, and after producing satisfactory evidence that they had completed the Course of Study prescribed by the College, have been admitted to Examination, and found qualified to practise the arts of Anatomy, Surgery, and Pharmacy, and have received Diplomas as Licentiates of the College accordingly.

Scotland.

Anderson, David
Anderson, Rt. Brunton
Ashenheim, Lewis
Beaton, Daniel
Beatson, Jn. Fullarton
Beattie, James
Beveridge, James Hall
Black, Thomas
Bonnar, George Lindsay
Bonong, Edward
Brown, Alexander
Bruce, James
Bryden, George Burnside
Buie, William
Burton, Matthew
Carlyle, Wm. Johnston
Catanach, James
Craig, William
Creelman, J. Auchterlonie
Cumming, Alexr. Grant
Denham, John
Dewar, James
Dickson, Robert
Douglas, A. Halliday
Duff, Charles Murray
Elliot, Robert
Fraser, James George
Fraser, John
Fraser, Roderick
Flett, Peter
Forbes, John
Garvie, James
Grant, James M.
Gordon, Charles Alexr.
Gordon, Henry D. Spens
Gow, Norman
Graham, Robert
Gray, John
Grierson, Thomas Boyle.
Gunnyon, Robt. Halliday
Handyside, Jn. Hepburn
Hill, James Archibald
Hornell, James
Howden, Wm. Marcus
Jack, John
Jeffrey, John
Johnston, John
Johnston, Ralph
Johnston, William
Kemp, Andrew
Kirkpatrick, James
Kirkwood, Alexander
Laidlaw, James
Laing, Patrick Sinclair
Lauder, George
Ledingham, George

Lee, James
Little, Archibald
Logie, Cosmo
Macbeth, James
M'Donald, Alexander
Machardy, F. Nicoll
M'Intosh, James
Mackay, John
Mackenzie, Duncan
M'Kenzie, Jn. Charles
Mackenzie, W. Maclean
M'Kinlay, David
M'Cormack, William
Macrae, John
Macquarrie, Robert
Millar, David
Miller, Robert
Morton, Andrew
Muir, William Mure
Niven, James
Orr, Robert Scott
Peter, James
Rae, George
Robertson, James
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Todd, Robert
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White, Archibald
Wilkinson, John
Wilson, David
Wright, Patrick
Young, Alexander

England.

Biesley, Thomas
Blake, Charles Paget
Bucknill, Samuel Birch
Cameron, John
Davenport, Chas. Thos.
Dickson, John
Goddard, Samuel Palmer
Gray, Thomas Alexander
Morrison, John
Parish, Henry
Sandys, James
Stevenson, William
Strutt, Charles Edward
Taylor, Henry
Walker, George Austin
Walsh, Francis Delaval
Wells, Henry
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Baxter, William R.
Bowman, Hy. Overend
Browne, Joseph
Duggan, James
Dwyer, William
Ekins, John Gartlan
Gallagher, John
Gamble, Hugh
Hastings, Robert
Lealy, William
Lee, Maurice
Nicolls, Simon
Tomb, Henry
Trotter, W. St Lawrence
Tyler, Alexander
Whiteside, Js. Hutchison

Abroad.

Bird, John Edward
Bremner, Bruce Allan
Browne, William
Cutting, A. T. Piggott
Donnet, Jas. John L.
Faithful, John James
Faskin, William
Fehrszen, Oloff Godleib
Graham, John Collin
Hay, John M'Dowall
Horak, John Andrew
Lawrence, Henry Parker
M'Cowan, Frs. Da Cruz
M'Laren, Lawrence
Rowand, Alexander
Trench, John Power
Seaman, Wm. Campbell
Skipton, Henry Stacy
Welsh, John
Wiehe, Chas. George

Extracted from the Records of the Royal College of Surgeons of Edinburgh, by
Wm. Scott, *Secy.*

Memorial of North of England Medical Association.—To the Most Noble the Marquess of Normanby, Her Majesty's Secretary of State for the Home Department, The Memorial of the Council of the North of England Medical Association.

My Lord,—We beg to submit to your notice a brief statement, relative to the existing condition of the medical profession in Great Britain and Ireland; and at the same time, respectfully, but strongly, to urge upon your Lordship, as a Minister of the Crown, the necessity of some legislative measure being applied to the correction of abuses and defects which, at the present moment, are productive of consequences injurious to the profession, and prejudicial to the safety and welfare of the public.

We are unwilling to intrude upon the time of your Lordship, by entering largely into detail: more especially as the subject in question has of late been repeatedly brought under the notice of Her Majesty's Government, and as it is known to us that your Lordship has recently been in communication with different bodies of the profession. But we are desirous, in common with our brethren in other parts of the empire, to express our anxiety, that the immediate attention of government, and the legislature may be devoted to the consideration of a question, in the satisfactory settlement of which, the interests of the whole community are deeply involved.

The medical profession of this country is devoid of organization or government; for although the empire abounds with medical colleges and corporations, it cannot be denied that this kingdom, above almost every nation in Europe, is notorious for neglect of matters relating to the preservation of the public health, and, as a natural consequence, for the unrestricted progress of medical imposture and empiricism.

The incapacity of the bulk of society to form a correct judgment as to the qualifications of any individual who may assume the medical character, should, we conceive, render it a duty incumbent on the legislature, to guard the public from being imposed upon by the pretensions or artifice of ignorant pretenders to medical knowledge. Duties involving so deep responsibility as those connected with the treatment of disease, should be undertaken solely by men whose fitness for their right performance shall have been tested before a competent tribunal. The inadequacy of existing institutions to afford the least security in this respect, has been fully substantiated. They are unable either to enforce the examination of candidates for medical practice, or to defend the properly qualified practitioner, against an unjust and unfair rivalry with uneducated and unlicensed competitors.

Nor is it merely in the relation subsisting between practitioners individually, and those who require their professional aid, that the inadequacy of existing laws and institutions is manifested. The services of medicine are constantly required, both in civil and criminal causes, occurring in courts of law; and upon the testimony of the medical witness, the verdicts of juries, in many instances wherein life and liberty are at stake, are mainly dependent. It is well known that such testimony is continually received from the lips of individuals, who, in consequence of the anomalous and unsettled condition of the medical profession, are permitted, without right or title, to assume the name, and exercise the functions of medical practitioners. Public appointments, moreover, have been liberally bestowed on such persons as are here spoken of, to the exclusion of those who have expended much time, labour, and capital in the acquirement of medical knowledge. It was shown by a deputation of medical gentlemen, (members of the British Medical Association,) which some time ago waited upon your Lordship's predecessor in the Home Office, that out of 1830 practitioners employed in the Poor Law Unions, 650 had been but *partially* tested as to their attainments, or, in other words, had been examined *either* in medicine *or* in surgery—NOT IN BOTH; while 233 *had undergone no examination whatsoever!* It is needless to affirm, that great injustice is inflicted by such transactions, upon gentlemen who have undergone lengthened courses of study and severe examinations, and who have spent considerable sums of money in making suitable preparation for entering upon medical practice. Nor is it necessary to impress upon your Lordship the expediency of every possible inducement being offered, with a view to encourage the entrance into the profession of well-educated men. Further illustration of the defects in medical government, of which we are now complaining, is to be found in most of the arrangements, which (under the Poor Law Amendment Act) have subsisted up to the present time, for supplying the pauper population of England and Wales with medical advice and attendance. The contracts which have been entered into throughout the greater number of the Unions have been as injurious to the poor, as they have been degrading to the profession. The immense extent of most of the districts has rendered it almost impossible for the one to receive, or the other to give, the necessary attention in time of sickness. The mode of appointing the medical officers, as we have already stated, has led, very commonly, to the election of incompetent persons; while the amount of their remuneration has not been sufficient to enable them to furnish a proper supply of medicines, either as to quantity or quality. The system, we have reason to believe, is likely to be amended. Any improvements, however, which may hereafter take place, will be attributable to the exertions of the *members* of our profession; and, in particular, to the praiseworthy efforts of the Provincial and British Medical Associations; and not to the intervention of any of those corporate bodies to which is entrusted the superintendence of medical affairs.

The imperfections of the Colleges and other examining and licensing Boards, is equally apparent in respect of medical education. Degrees, diplomas, and licenses to practise, are to be obtained from not fewer than nineteen different sources, which, notwithstanding the identical nature of the duties devolving on practitioners *generally*, throughout *every* part of the United Kingdom, differ essentially in the duration and extent of the studies enjoined by their curricula, and in the character and strictness of their examinations, causing thereby a want of uniformity, which cannot fail to strike your Lordship as being eminently calculated to injure the cause of science.

To a defective and feeble constitution of the medical profession, may likewise be ascribed the backward condition of medical police, and the unimpeded career of empiricism, for which this country has ever been conspicuous. Although not so sanguine as to anticipate that any legislation will *of itself* be able to effect the total extinction of empiricism, we are yet of opinion, that steps should be taken to prevent, as far as possible, the mischievous and to often fatal consequences to which it is continually giving rise; and we cannot but regret, that any portion of the public revenue should be obtained from a source replete with fraud and danger.

The practice of pharmacy is also in need of legislative interference—any individual being allowed, in this kingdom, to prepare and dispense medicines of every kind, and to sell the most deadly poisons, without supervision or control. The College of Physicians, and the Society of Apothecaries of London, are bound, by their charters of incorporation, to visit the shops, and to examine, personally, the medicines of apothecaries and druggists; but this duty, it is well known, has by each of those bodies been most grossly neglected.

The foregoing statement, we trust, will be sufficient to convince your Lordship, that evils of no inconsiderable magnitude have arisen from the want of any thing like system or organization in the government of the medical profession of this empire, and that the members thereof, in appealing to Parliament, are endeavouring to effect the removal of abuses which operate to the serious disadvantage of all classes of Her Majesty's subjects. Under their present constitution, the medical colleges and corporations are utterly inefficient as instruments for promoting the physical well-being of the people. They are, for the most part, under the direction of self-elected, irresponsible councils, which have hitherto displayed but little zeal or energy, either in watching over the public health, or in asserting the privileges, and protecting the interests, of the medical profession.

In thus addressing your Lordship, our object is not to offer any specific plan for the removal of the abuses and anomalies of which we have to complain, but to make such representation of their pernicious tendency as may attract the attention of Her Majesty's Ministers, and of Parliament, to a subject which, we are fully persuaded, presents the strongest claims to the serious consideration of the statesman and the legislator.

We may venture, however, in conclusion, to state, that, in our opinion, the remedy for existing evils will be found to consist in the enactment of such laws as will place the medical profession under an organized system of government, which shall be *responsible* to Parliament and to the profession, and to which shall be entrusted the superintendence and control of medical education, practice, and police. Under such a system, the public health might, we conceive, be adequately protected, and the kingdom be supplied with a well educated and competent body of medical practitioners. The entrance into the profession of any one whose qualifications had not been properly ascertained, would be effectually prevented; uniformity of education and of examination would be enforced throughout the empire; and reciprocal privileges would, as a natural consequence, be secured to members of the profession irrespectively, whether practising in England, Scotland, or Ireland. The practice of pharmacy would also be placed under the supervision of a properly constituted authority; and the dangers and deceit of empiricism, if not entirely suppressed, would at least, be greatly mitigated.—Signed, on behalf of the Council,

T. E. Headlam, M.D., President.
Charles T. Carter, Secretary.

Newcastle-upon-Tyne, Feb. 12. 1840.

Public Meeting in Stirling in favour of Medical Reform.—Besides the numerous meetings of professional gentlemen held from time to time in various places of England and Wales, regarding the present anomalous state of the medical profession, and the best means of rectifying the evils so generally and so frequently made the subject of complaint, we have to notice that a numerous and respectable meeting, of the members of the Stirling Medical Association and other practitioners in the district, with the same object, was held on Friday the 12th of June last (1840), in the town of Stirling. This meeting had originated not merely in the conviction of the multiplied evils and hardships under which practitioners in medicine and surgery at present labour, from the great number of licensing boards, but also in the circumstance of the example set by various meetings in different parts of England, and, above all, by the active and indefatigable endeavours of the Provincial Medical Association. Mr Forrest, Vice-President of the Association was called to the chair; and the meeting was addressed by that gentleman, who ably explained the general objects which they had in view; and afterwards by Dr Ross, Dr Muschet, Mr Rae, Mr Thomson, and Mr Syme.

The following resolutions were agreed to, and embodied in a petition:

Unto the Honourable the Commons of Great Britain and Ireland in Parliament assembled,

The Petition of the Members of the Stirling Medical Association, and other Medical Practitioners in this district, in public meeting convened at Stirling this twelfth day of June, one thousand eight hundred and forty years,

Humbly Sheweth,—That the Medical profession of Scotland labours under various grievances, of which the following are the principal:—

1*st*, That from the number of licensing bodies in Great Britain and Ireland, amounting to not fewer than eighteen, having no uniform standard of qualification, required from candidates for admission into the medical profession, persons of inferior education often receive licenses to practise medicine and surgery.

2*d*, That many individuals assume the office and title of Physician or Surgeon, who have no legal right thereto, and that the public having no means, especially in country districts, of ascertaining whether they are legally qualified or not, often suffer from such persons serious and even fatal injuries.

3*d*, That Scottish licentiates are not allowed to practise in England or Ireland, without submitting to an examination by an inferior body, which they consider unjust to themselves and derogatory to the Royal Colleges of which they are members or licentiates.

4*th*, That individuals without any proper education, or undergoing any examination, assume the office of chemist, druggist, or apothecary, and compound and sell medicines, frequently to the serious injury of the public.

With the view of removing these grievances, and others well-known to many members of your honourable House, your petitioners pray, That a law may be speedily enacted, establishing a Medical Faculty or Board, for the United Kingdom of Great Britain and Ireland, with the following powers:—

I. To superintend and regulate the education of Students in Medicine, in Great Britain and Ireland, agreeably to a high and uniform standard, and when found duly qualified, to admit them members of the medical profession.

II. To keep a public register of Medical practitioners, and to prosecute all persons who practise medicine illegally.

III. To empower persons admited as members of the medical profession, to practise medicine in all its branches, in any part of her Majesty's dominions.

IV. To superintend the education of, and after a competent examination, grant licenses to druggists, chemists, and apothecaries; and to prohibit the sale of medicines by all other persons.

May it therefore please your honourable House to grant the prayer of the foregoing petition, or otherwise to do in the matter as to your honourable House shall seem right.—And your petitioners shall ever pray.

Provincial Medical and Surgical Association of England and Wales.—The eighth anniversary of this most respectable and useful body was held on Wednesday the 22d and Thursday the 23d of July, at Southampton. It was attended by many members and eminent men in the profession from various parts of the United Kingdom. The British Medical Association was represented by Dr Webster and Dr Grant; the Irish Medical Association had three deputies in the persons of Sir James Murray, M.D., Dr Maunsell, and Mr Carmichael; Mr Carter appeared in behalf of the North of England Medical Association.

The first general meeting took place on Wednesday the 22d at two o'clock P. M., in the Audit House, when Dr Jeffreys of Liverpool, the retiring president, took the chair and delivered an able valedictory address, in which he adverted to the advantages furnished by the Association, and its prosperous condition, the Vaccination Report, and the subject of Medical Reform, and then vacated the chair to Dr Steed of Southampton, who addressed the meeting in an interesting harangue. After voting addresses of congratulation to Her Majesty, to Prince Albert, and the Duchess of Kent, the subjects that chiefly occupied the attention of the Association were, the subject of Parochial Medical Relief, Vaccination, and Medical Reform, on each of which subjects various important facts were communicated and judicious observations made by the members.

At the second general meeting, which was held in the evening of the same day, at the same place, Mr Dodd of Chichester read the Retrospective Report on the progress of Surgery during the previous year; and at the third general meeting, which was held on Thursday the 23d July, Dr Scott read the Retrospective Report on the progress of the Medical Sciences, especially Physiology and Pathology, during the previous twelve months.

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Edin^r. Med. & Surg. Jour. FIGURES ILLUSTRATING M^r. THOMSON'S CASES. Plate I. p. 75. Vol.

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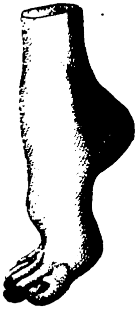

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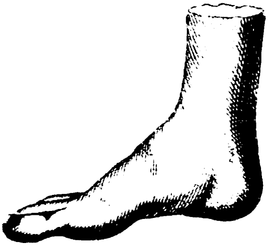

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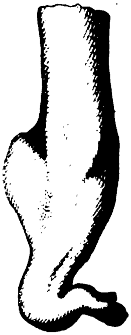

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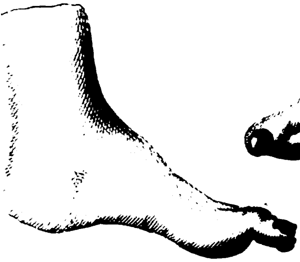

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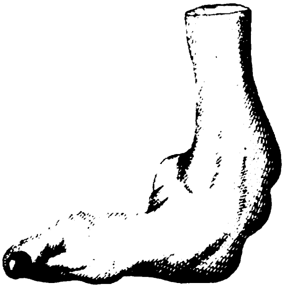

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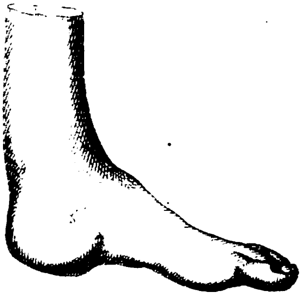

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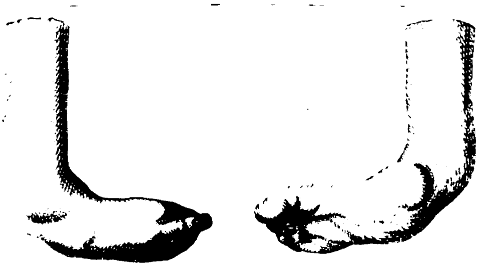

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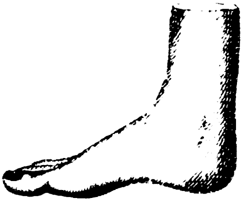

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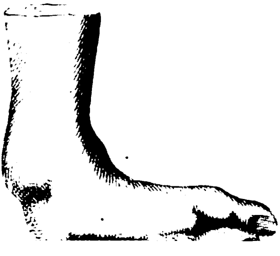

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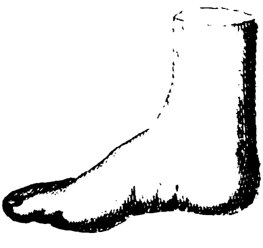

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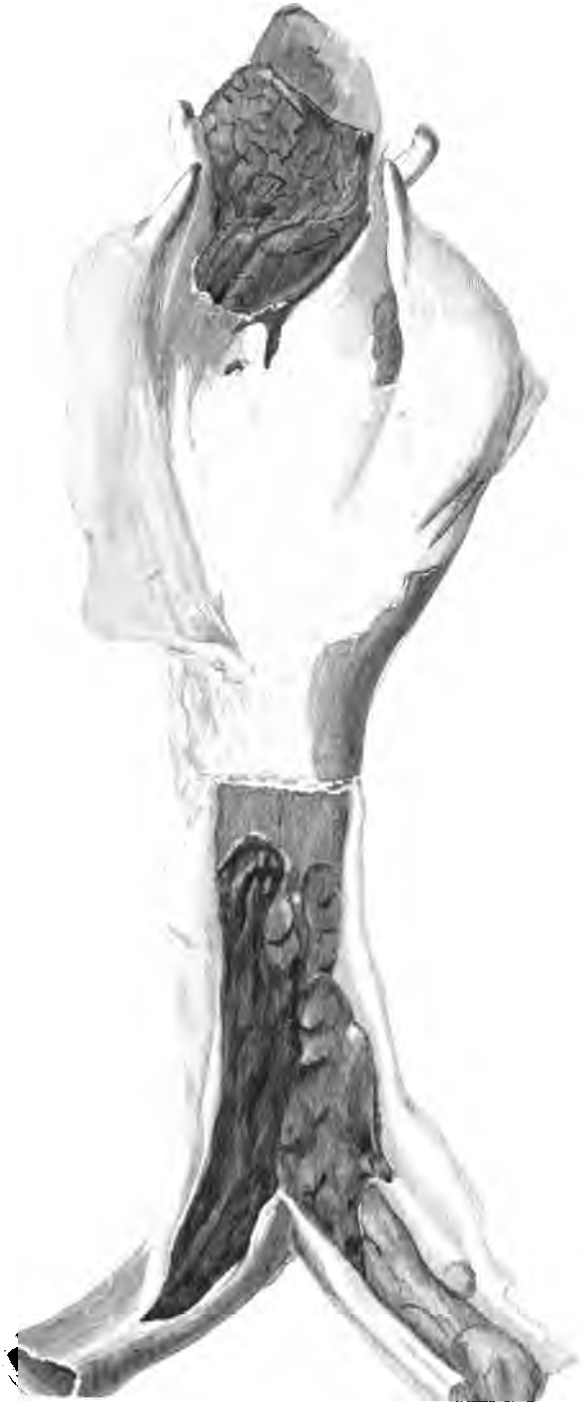

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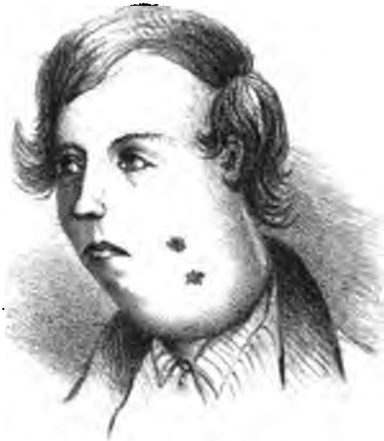
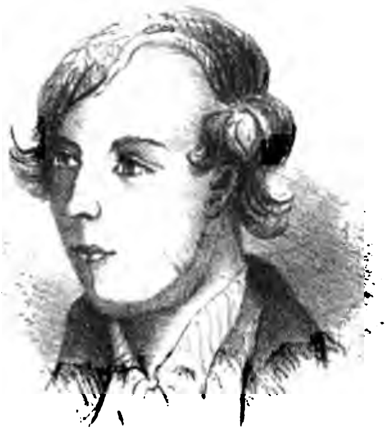
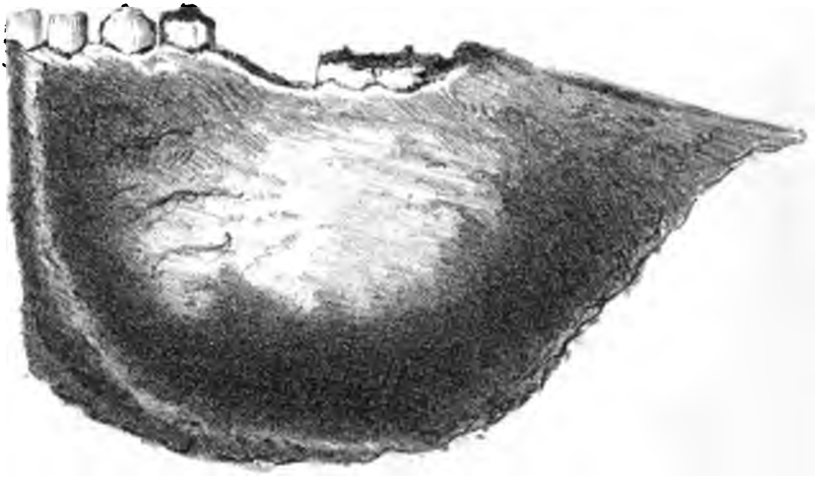


Appearance before operation.



Appearance after operation.

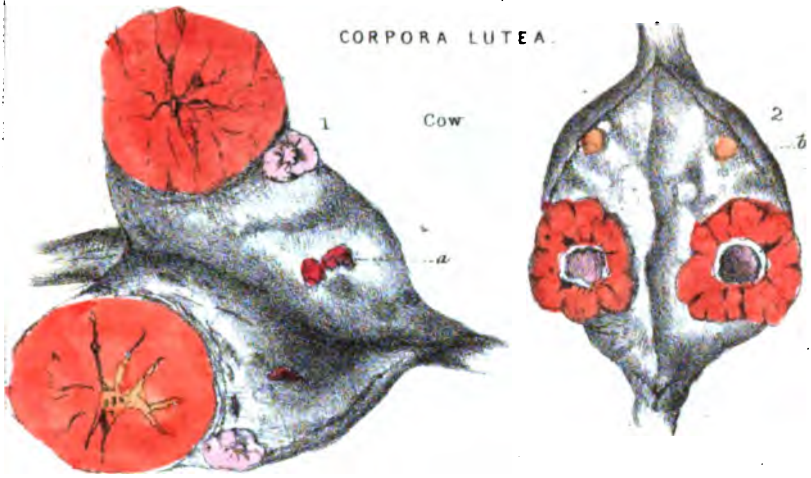


Actual size and appearance of diseased portion of Jaw removed.

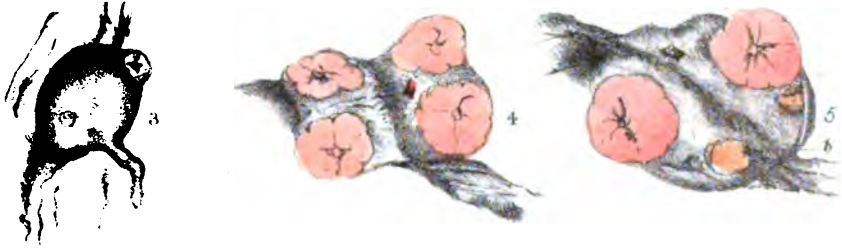
Edin: Med & Sur. Jour: Pl. IV. Vol. LIV. p. 406.

CORPORA LUTEA.

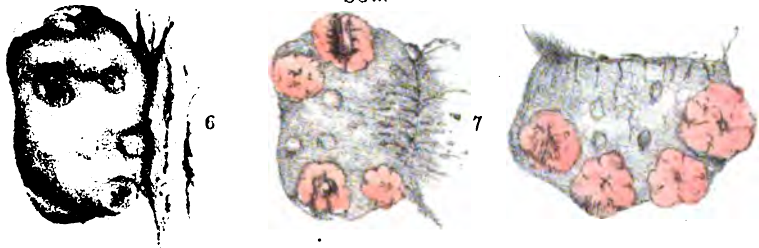
Cow



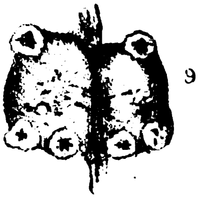
Ewe



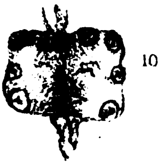
Sow



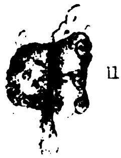
Bitch



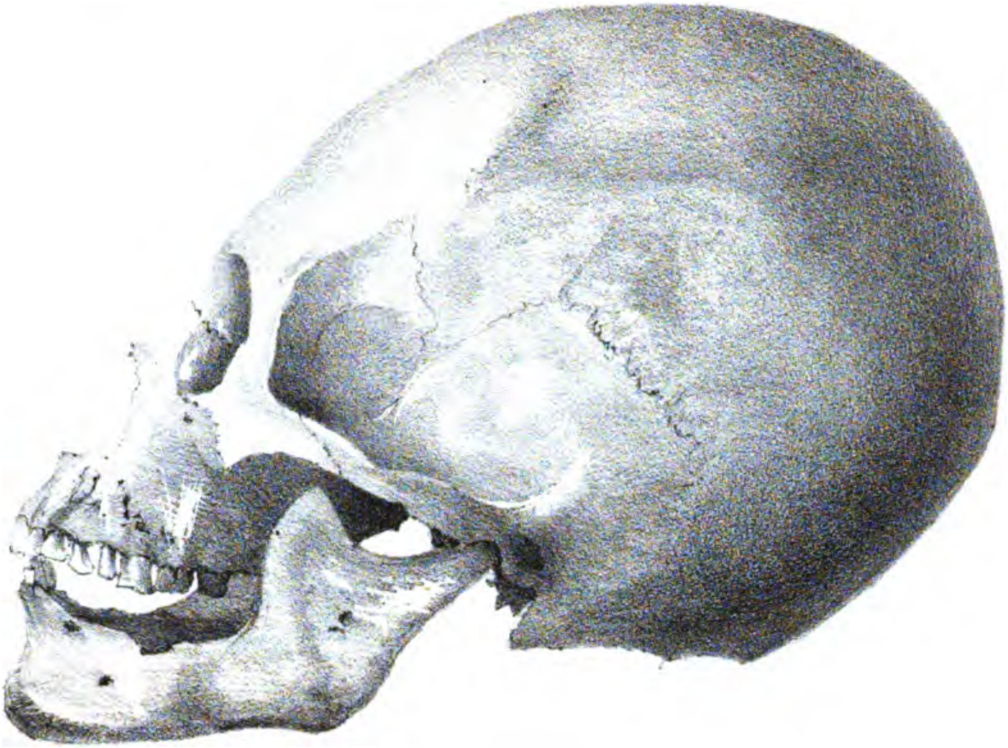
Cat



Rabbit

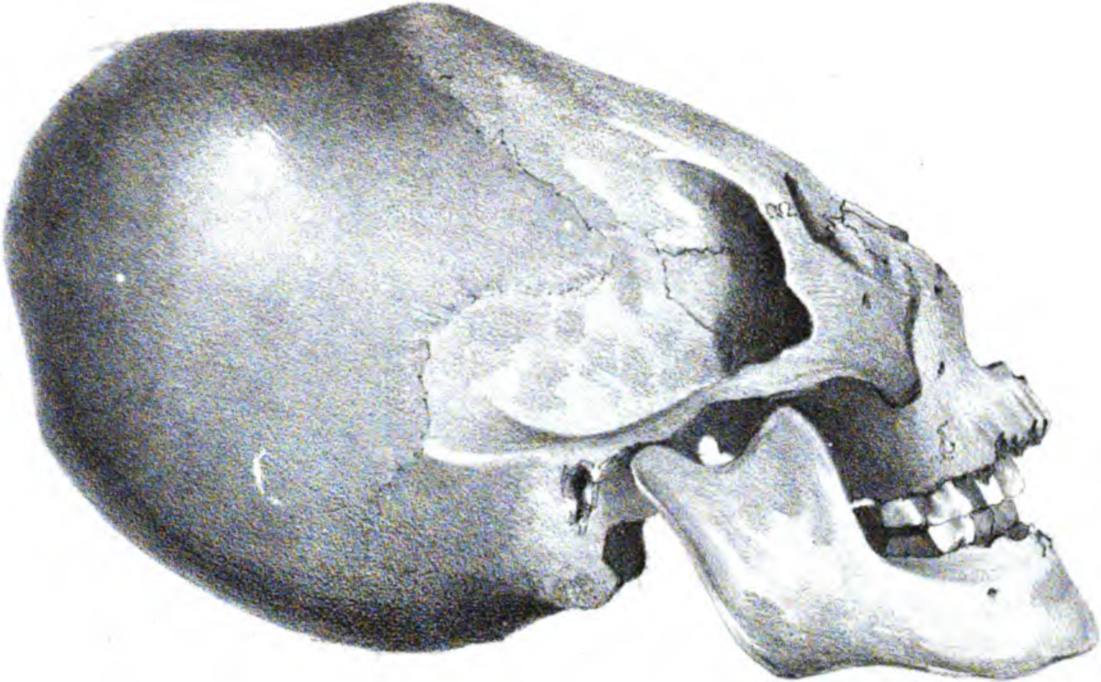


Edin. Med. & Sur. Jour. Vol. LIV p 458.



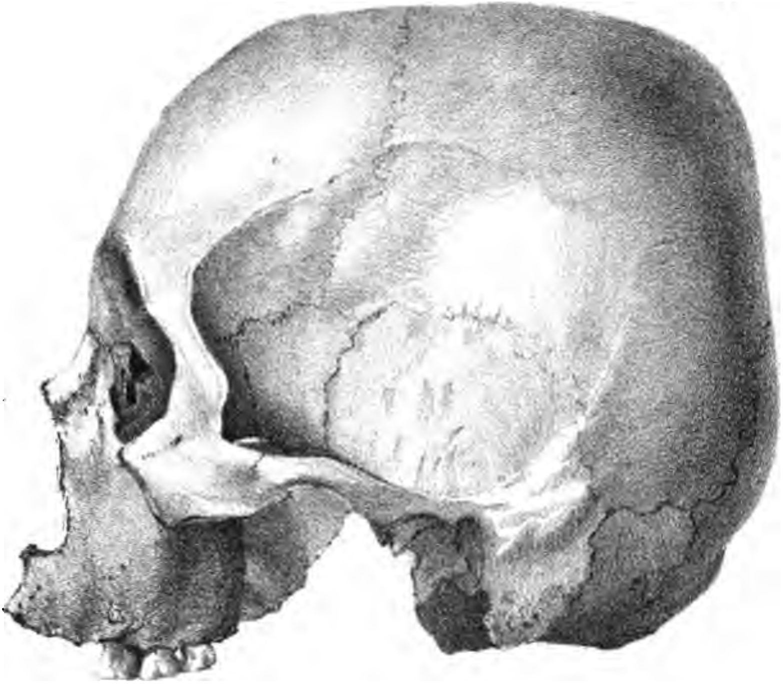
ANCIENT PERUVIAN FROM ATACAMA.

PLATE VI.

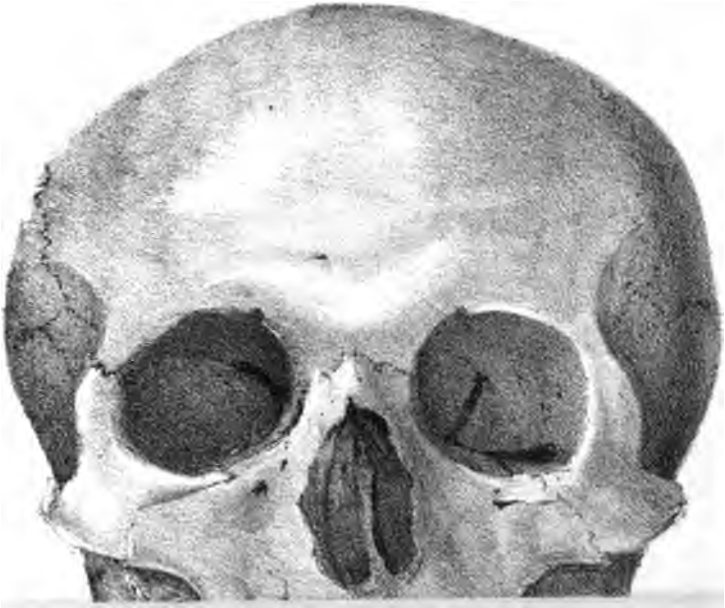


PERUVIAN, (THE ANCIENT RACE).

Nichol lithog. Edin

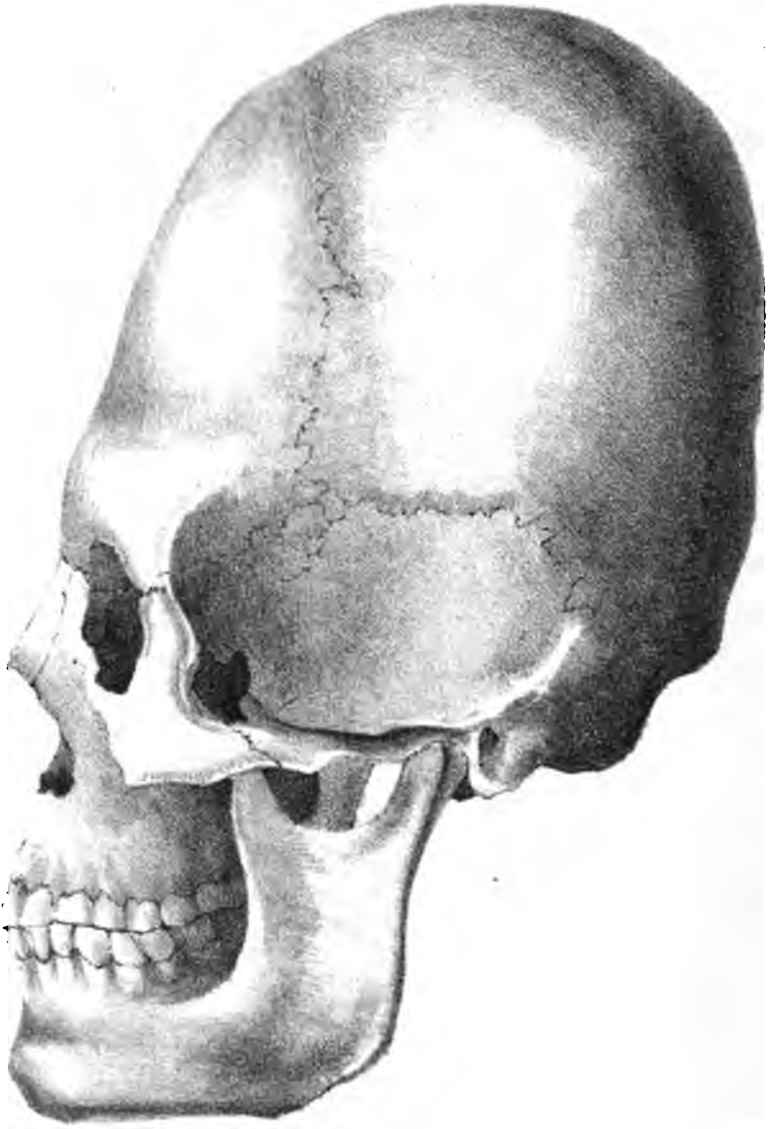


PERUVIAN (FROM THE TEMPLE OF THE SUN).

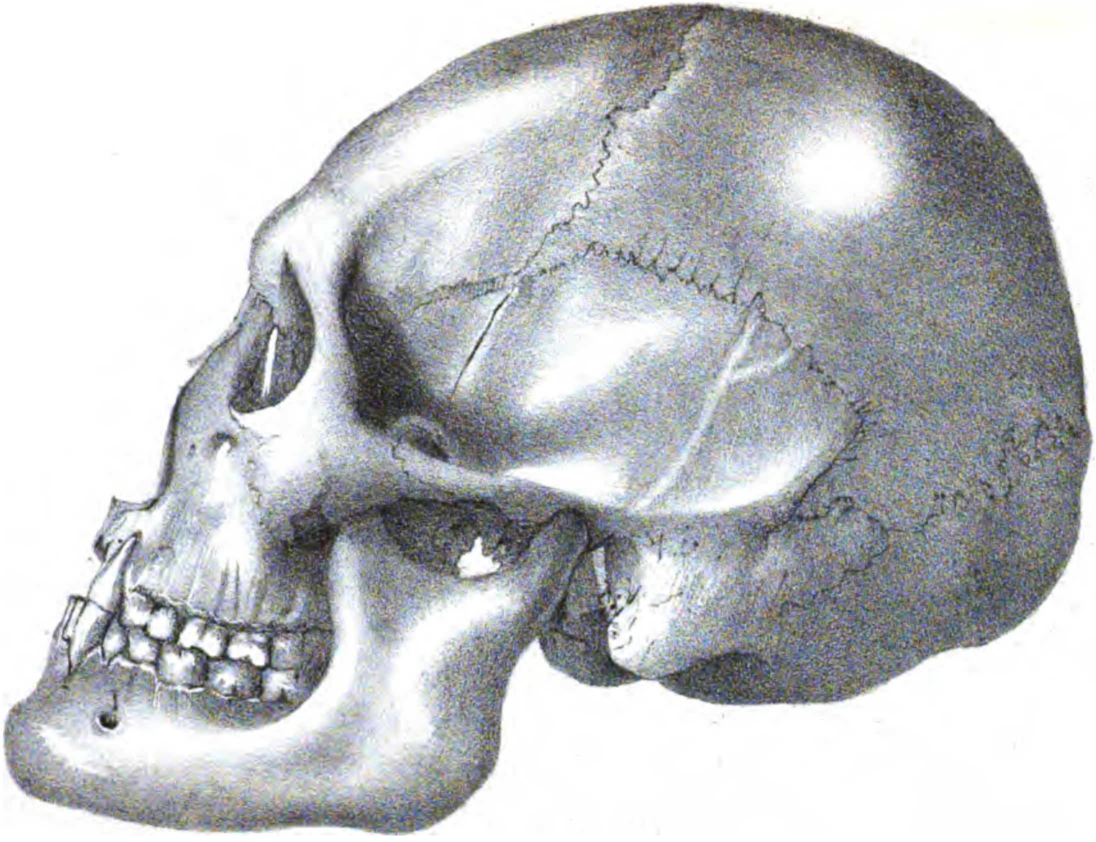


NATCHEZ.

PERUVIAN (FROM THE TEMPLE OF THE SUN).



NATCHEZ.



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